S1 Table of Contents

[1. Forest & Woodland 11](#_Toc532988054)

[1.A. Tropical Forest & Woodland 11](#_Toc532988055)

[1.A.1. Tropical Dry Forest & Woodland 11](#_Toc532988056)

[D099. Caribbean-Mesoamerican Dry Forest & Woodland 11](#_Toc532988057)

[M296. Caribbean-Mesoamerican Pine Dry Forest 17](#_Toc532988058)

[M134. Caribbean Coastal Lowland Dry Forest 21](#_Toc532988059)

[M294. Caribbean Dry Limestone Forest 25](#_Toc532988060)

[M561. Caribbean-Mesoamerican Seasonal Dry Forest 26](#_Toc532988061)

[M562. Pacific Mesoamerican Seasonal Dry Forest 28](#_Toc532988062)

[D219. Colombian-Venezuelan Dry Forest 30](#_Toc532988063)

[M563. Guajiran Seasonal Dry Forest 32](#_Toc532988064)

[M565. Llanos Seasonal Dry Forest 34](#_Toc532988065)

[M566. Tumbes Guayaquil Seasonal Dry Forest 36](#_Toc532988066)

[M573. Northern Andean Seasonal Dry Forest 38](#_Toc532988067)

[D220. Guianan Dry Forest 40](#_Toc532988068)

[M567. Central Guianan Seasonal Dry Forest 42](#_Toc532988069)

[D221. Brazilian-Parana Dry Forest 43](#_Toc532988070)

[M572. Caatinga Seasonal Dry Forest 45](#_Toc532988071)

[M872. Cerradâo Sclerophyllous Woodland 47](#_Toc532988072)

[M570. Cerrado Seasonal Dry Forest 49](#_Toc532988073)

[M568. Brazilian Atlantic Seasonal Dry Forest 51](#_Toc532988074)

[M571. Parana Seasonal Dry Forest 53](#_Toc532988075)

[D222. Tropical Andean Montane Dry Forest 55](#_Toc532988076)

[M575. Bolivian-Tucuman Seasonal Dry Forest 56](#_Toc532988077)

[M574. Central Andean Seasonal Dry Forest 58](#_Toc532988078)

[1.A.2. Tropical Lowland Humid Forest 60](#_Toc532988079)

[D091. Caribbean-Mesoamerican Lowland Humid Forest [Low - Poorly Documented] 60](#_Toc532988080)

[M281. Caribbean Lowland Humid Forest [Low - Poorly Documented] 62](#_Toc532988081)

[M578. Mesoamerican Lowland Humid Forest 64](#_Toc532988082)

[M873. Mesoamerican Submontane Humid Forest 68](#_Toc532988083)

[D224. Colombian-Venezuelan Lowland Humid Forest 70](#_Toc532988084)

[M581. Choco-Darien Humid Forest 71](#_Toc532988085)

[M582. Western Ecuadorian Humid Forest 73](#_Toc532988086)

[M580. Catatumbo Magdalena Humid Forest 75](#_Toc532988087)

[M579. Guajiran Humid Forest 77](#_Toc532988088)

[M583. Llanos Humid Forest 79](#_Toc532988089)

[D225. Guianan Lowland Humid Forest 81](#_Toc532988090)

[M586. Eastern Guianan Humid Forest 83](#_Toc532988091)

[M585. Central Guianan Humid Forest 84](#_Toc532988092)

[M584. Western Guianan Humid Forest 86](#_Toc532988093)

[M587. Orinoquian Humid Forest 88](#_Toc532988094)

[D226. Amazonian Lowland Humid Forest 90](#_Toc532988095)

[M593. Central Amazon Humid Forest 92](#_Toc532988096)

[M592. Northern Amazon Humid Forest 93](#_Toc532988097)

[M590. Southwestern Amazon Lowland Humid Forest 95](#_Toc532988098)

[M591. Southwestern Amazon Subandean Humid Forest 97](#_Toc532988099)

[M588. Western Amazon Lowland Humid Forest 99](#_Toc532988100)

[M589. Western Amazon Subandean Humid Forest 101](#_Toc532988101)

[D227. Brazilian-Parana Lowland Humid Forest 102](#_Toc532988102)

[M597. Cerrado Humid Forest 104](#_Toc532988103)

[M595. Brazilian Atlantic Humid Forest 106](#_Toc532988104)

[M596. Parana Humid Forest 108](#_Toc532988105)

[1.A.3. Tropical Montane Humid Forest 110](#_Toc532988106)

[D228. Caribbean-Mesoamerican Montane Humid Forest [Low - Poorly Documented] 110](#_Toc532988107)

[M598. Caribbean Montane Humid Forest [Low - Poorly Documented] 112](#_Toc532988108)

[M601. Mesoamerican Montane Pine-Oak Forest 114](#_Toc532988109)

[M600. Mesoamerican Montane Humid Forest 116](#_Toc532988110)

[M602. Southern Mesoamerican Montane Humid Forest 118](#_Toc532988111)

[D229. Guianan Montane Humid Forest 121](#_Toc532988112)

[M604. Eastern Guianan Montane Humid Forest 122](#_Toc532988113)

[M603. Central Guianan Montane Humid Forest 124](#_Toc532988114)

[D231. Tropical Andean Montane Humid Forest 126](#_Toc532988115)

[M613. Bolivian-Tucuman Lower Montane Humid Forest 128](#_Toc532988116)

[M612. Bolivian-Tucuman Montane & Upper Montane Humid Forest 130](#_Toc532988117)

[M611. Central Andean (Yungas) Lower Montane Humid Forest 132](#_Toc532988118)

[M610. Central Andean (Yungas) Montane & Upper Montane Humid Forest 134](#_Toc532988119)

[M615. Eastern Subandean Ridge Montane Humid Forest 135](#_Toc532988120)

[M614. Moist Puna Humid Forest 137](#_Toc532988121)

[M607. Northern Andean Lower Montane Humid Forest 139](#_Toc532988122)

[M606. Northern Andean Montane & Upper Montane Humid Forest 141](#_Toc532988123)

[M609. Northern Andean Venezuelan Coastal Ridge Forest 143](#_Toc532988124)

[D232. Brazilian-Parana Montane Humid Forest 144](#_Toc532988125)

[M616. Brazilian Atlantic Montane Humid Forest 146](#_Toc532988126)

[1.A.4. Tropical Flooded & Swamp Forest 148](#_Toc532988127)

[D093. Caribbean-Central American Flooded & Swamp Forest 148](#_Toc532988128)

[M618. Caribbean Floodplain Forest [Low - Poorly Documented] 150](#_Toc532988129)

[M617. Caribbean Swamp Forest 152](#_Toc532988130)

[M620. Mesoamerican Floodplain Forest 155](#_Toc532988131)

[M619. Mesoamerican Coastal Plain Swamp Forest 158](#_Toc532988132)

[D233. Colombian-Venezuelan Flooded & Swamp Forest 161](#_Toc532988133)

[M622. Choco-Darien Floodplain Forest 162](#_Toc532988134)

[M621. Guajiran Flooded Forest 165](#_Toc532988135)

[M625. Guayaquil Flooded & Swamp Forest 167](#_Toc532988136)

[M624. Llanos Flooded & Swamp Forest 168](#_Toc532988137)

[D234. Guianan Flooded & Swamp Forest 170](#_Toc532988138)

[M626. Guianan Riparian Forest 172](#_Toc532988139)

[M627. Guianan Swamp Forest 174](#_Toc532988140)

[M628. Orinoco Delta Swamp Forest 176](#_Toc532988141)

[D235. Tropical Andean Riparian & Flooded Forest 178](#_Toc532988142)

[M631. Bolivian-Tucuman Dry Valley Riparian Forest 179](#_Toc532988143)

[M632. Eastern Subandean Ridge Flooded Forest 181](#_Toc532988144)

[M630. Central Andean Riparian Forest 183](#_Toc532988145)

[M629. Northern Andean Riparian Forest 185](#_Toc532988146)

[D236. Amazonian Flooded & Swamp Forest 186](#_Toc532988147)

[M640. Amazon Delta Swamp Forest 188](#_Toc532988148)

[M638. Central Amazon Floodplain Forest 190](#_Toc532988149)

[M637. Northern Amazon Floodplain Forest 192](#_Toc532988150)

[M639. South-Central Amazon Floodplain Forest 194](#_Toc532988151)

[M636. Southern Amazon Swamp Forest 196](#_Toc532988152)

[M635. Southwestern Amazon Floodplain Forest 197](#_Toc532988153)

[M633. Western Amazon Floodplain Forest 199](#_Toc532988154)

[M634. Western Amazon Swamp Forest 201](#_Toc532988155)

[D237. Brazilian-Parana Flooded & Swamp Forest 203](#_Toc532988156)

[M641. Brazilian Atlantic Coastal Plain Swamp Forest 205](#_Toc532988157)

[M642. Parana Floodplain Forest 207](#_Toc532988158)

[M646. Pantanal Floodplain Forest 209](#_Toc532988159)

[M643. Cerrado Floodplain Forest 211](#_Toc532988160)

[M644. Beni Chiquitano Swamp Forest 213](#_Toc532988161)

[M645. Beni Floodplain Forest 214](#_Toc532988162)

[D238. Chaco Flooded & Swamp Forest & Woodland 216](#_Toc532988163)

[M650. Southern Chaco Floodplain Forest & Woodland 218](#_Toc532988164)

[M647. Northern Chaco Floodplain Forest & Woodland 220](#_Toc532988165)

[M649. Northern Chaco Palm Swamp 222](#_Toc532988166)

[M648. Northern Chaco Riparian Scrub & Woodland 224](#_Toc532988167)

[1.B. Temperate & Boreal Forest & Woodland 225](#_Toc532988168)

[1.B.1. Warm Temperate Forest & Woodland 225](#_Toc532988169)

[D239. Chilean Warm Temperate Forest & Woodland 226](#_Toc532988170)

[M652. Chilean Mediterranean Sclerophyllous Forest 227](#_Toc532988171)

[M653. Chilean Mediterranean Deciduous Forest 229](#_Toc532988172)

[D240. Southeastern South American Warm Temperate Forest & Woodland 231](#_Toc532988173)

[M654. Espinal Deciduous Forest & Woodland 233](#_Toc532988174)

[D006. Southeastern North American Forest & Woodland 235](#_Toc532988175)

[M885. Southeastern Coastal Plain Evergreen Oak - Mixed Hardwood Forest 239](#_Toc532988176)

[1.B.2. Cool Temperate Forest & Woodland 241](#_Toc532988177)

[D241. Valdivian Cool Temperate Forest 241](#_Toc532988178)

[M656. Valdivian Lower Montane Deciduous Forest 243](#_Toc532988179)

[M655. Valdivian Lower Montane Evergreen Forest 245](#_Toc532988180)

[M657. Valdivian Montane & Upper Montane Deciduous Forest 247](#_Toc532988181)

[M658. Valdivian Montane & Upper Montane Evergreen Forest 249](#_Toc532988182)

[D242. Magellanian Cool Temperate Forest 251](#_Toc532988183)

[M659. Magellanian Temperate Evergreen Forest 252](#_Toc532988184)

[D008. Eastern North American Forest & Woodland 254](#_Toc532988185)

[M502. Appalachian-Northeastern Oak - Hardwood - Pine Forest & Woodland 257](#_Toc532988186)

[M883. Appalachian-Interior-Northeastern Mesic Forest 261](#_Toc532988187)

[M882. Central Midwest Mesic Forest 263](#_Toc532988188)

[M159. Laurentian-Acadian Pine - Hardwood Forest & Woodland 266](#_Toc532988189)

[D194. Rocky Mountain Forest & Woodland 269](#_Toc532988190)

[M501. Central Rocky Mountain Dry Lower Montane-Foothill Forest 274](#_Toc532988191)

[M500. Central Rocky Mountain Mesic Lower Montane Forest 283](#_Toc532988192)

[D192. Vancouverian Forest & Woodland 288](#_Toc532988193)

[M886. Southern Vancouverian Dry Foothill Forest & Woodland 293](#_Toc532988194)

[D326. North American Great Plains Forest & Woodland 295](#_Toc532988195)

[M151. Great Plains Forest & Woodland 298](#_Toc532988196)

[1.B.3. Temperate Flooded & Swamp Forest 301](#_Toc532988197)

[D243. Pampean Temperate Flooded & Swamp Forest 301](#_Toc532988198)

[M661. Espinal Floodplain Forest 303](#_Toc532988199)

[D244. Chilean Mediterranean Flooded & Swamp Forest 305](#_Toc532988200)

[M662. Chilean Mediterranean & Desert Riparian & Flooded Forest 307](#_Toc532988201)

[D245. Valdivian Temperate Flooded & Swamp Forest 308](#_Toc532988202)

[M663. Valdivian Temperate Flooded & Swamp Forest 310](#_Toc532988203)

[D246. Northern Patagonian Flooded Forest 312](#_Toc532988204)

[M664. Monte Floodplain Forest 314](#_Toc532988205)

[D011. Eastern North American-Great Plains Flooded & Swamp Forest 316](#_Toc532988206)

[M503. Central Hardwood Swamp Forest 319](#_Toc532988207)

[M504. Laurentian-Acadian-North Atlantic Coastal Flooded & Swamp Forest 322](#_Toc532988208)

[D062. Southeastern North American Flooded & Swamp Forest 327](#_Toc532988209)

[M161. Pond-cypress Basin Swamp 330](#_Toc532988210)

[M033. Southern Coastal Plain Basin Swamp & Flatwoods 333](#_Toc532988211)

[M154. Southern Great Plains Floodplain Forest & Woodland 337](#_Toc532988212)

[D195. Rocky Mountain-Great Basin Montane Flooded & Swamp Forest 340](#_Toc532988213)

[M034. Rocky Mountain-Great Basin Montane Riparian & Swamp Forest 343](#_Toc532988214)

[D013. Western North American Interior Flooded Forest 348](#_Toc532988215)

[M660. Mexican Interior Riparian Forest 351](#_Toc532988216)

[M036. Interior Warm & Cool Desert Riparian Forest 353](#_Toc532988217)

[D193. Vancouverian Flooded & Swamp Forest 356](#_Toc532988218)

[M035. Vancouverian Flooded & Swamp Forest 360](#_Toc532988219)

[1.B.4. Boreal Forest & Woodland 364](#_Toc532988220)

[D014. North American Boreal Forest & Woodland 364](#_Toc532988221)

[M495. Eastern North American Boreal Forest 369](#_Toc532988222)

[M496. West-Central North American Boreal Forest & Woodland 374](#_Toc532988223)

[1.B.5. Boreal Flooded & Swamp Forest 384](#_Toc532988224)

[D016. North American Boreal Flooded & Swamp Forest 384](#_Toc532988225)

[M299. North American Boreal Conifer Poor Swamp 388](#_Toc532988226)

[2. Shrub & Herb Vegetation 391](#_Toc532988227)

[2.A. Tropical Grassland, Savanna & Shrubland 391](#_Toc532988228)

[2.A.1. Tropical Lowland Grassland, Savanna & Shrubland 391](#_Toc532988229)

[D094. Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland 391](#_Toc532988230)

[M671. Caribbean Dry Scrub 393](#_Toc532988231)

[M672. Northern Mesoamerican Pine Savanna 396](#_Toc532988232)

[M673. Northern Mesoamerican Savanna & Shrubland 400](#_Toc532988233)

[D124. Amazonian Savanna & Shrubland 403](#_Toc532988234)

[M346. Central Amazon Savanna 405](#_Toc532988235)

[M345. Western Amazon Savanna 407](#_Toc532988236)

[D126. Brazilian-Parana Lowland Grassland, Savanna & Shrubland 408](#_Toc532988237)

[M684. Brazilian Atlantic Coastal Plain Savanna & Woodland 410](#_Toc532988238)

[M688. Parana Upland Savanna & Shrubland 412](#_Toc532988239)

[M685. Cerrado Savanna 414](#_Toc532988240)

[D249. Colombian-Venezuelan Lowland Grassland, Savanna & Shrubland 416](#_Toc532988241)

[M676. Llanos Upland Savanna 418](#_Toc532988242)

[D250. Guianan Lowland & Upland Grassland, Savanna & Shrubland 420](#_Toc532988243)

[M681. Eastern Guianan Savanna & Shrubland 421](#_Toc532988244)

[M679. Central Guianan Savanna & Shrubland 423](#_Toc532988245)

[M680. Western Guianan Savanna& Shrubland 425](#_Toc532988246)

[2.A.2. Tropical Montane Grassland & Shrubland 427](#_Toc532988247)

[D134. Tropical Andean Grassland & Shrubland 427](#_Toc532988248)

[M377. Bolivian-Tucuman Montane Grassland & Shrubland 429](#_Toc532988249)

[M696. Central Andean (Yungas) Upper Montane Grassland & Shrubland 431](#_Toc532988250)

[M375. Northern Andean Montane & Upper Montane Grassland & Shrubland 433](#_Toc532988251)

[M378. Moist Puna Grassland & Scrub 434](#_Toc532988252)

[M694. Northern Andean Paramo 436](#_Toc532988253)

[D135. Caribbean-Mesoamerican Montane & High Montane Grassland & Shrubland [Low - Poorly Documented] 438](#_Toc532988254)

[M691. Mesoamerican Montane Grassland & Shrubland 440](#_Toc532988255)

[D252. Guianan Montane Grassland & Shrubland 441](#_Toc532988256)

[M693. Tepuyan Mesic Grass & Forb Meadow 443](#_Toc532988257)

[M692. Tepuyan Sclerophyllous Shrubland 445](#_Toc532988258)

[D253. Brazilian-Parana Montane Grassland & Shrubland 447](#_Toc532988259)

[M699. Brazilian-Parana Montane Grassland, Savanna & Forb Meadow 449](#_Toc532988260)

[2.A.3. Tropical Scrub & Herb Coastal Vegetation 450](#_Toc532988261)

[D254. Caribbean-Mesoamerican Dune & Coastal Grassland & Shrubland 451](#_Toc532988262)

[M700. Caribbean-Mesoamerican Coastal Dune & Beach 452](#_Toc532988263)

[D255. Tropical Western Atlantic Dune & Coastal Grassland & Shrubland 455](#_Toc532988264)

[M702. Brazilian Atlantic Coastal Beach & Dune 457](#_Toc532988265)

[M701. Eastern Guianan Coastal Rocky Shore & Beach 459](#_Toc532988266)

[D256. Tropical Eastern Pacific Dune & Coastal Grassland & Shrubland 461](#_Toc532988267)

[M703. Tropical Eastern Pacific Coastal Beach & Dune 463](#_Toc532988268)

[2.B. Temperate & Boreal Grassland & Shrubland 464](#_Toc532988269)

[2.B.1. Mediterranean Scrub & Grassland 465](#_Toc532988270)

[D273. Chilean Mediterranean Scrub, Grassland & Forb Meadow 465](#_Toc532988271)

[M742. Central Chilean Interior Scrub 466](#_Toc532988272)

[M741. Central Chilean Coastal Scrub 468](#_Toc532988273)

[M743. Southern Andean Mediterranean Montane Scrub & Forb Meadow 470](#_Toc532988274)

[D274. Chaco-Espinal Scrub & Grassland 472](#_Toc532988275)

[M744. Chaco Serrano Scrub & Grassland 474](#_Toc532988276)

[M745. Monte Scrub & Grassland 476](#_Toc532988277)

[D327. Californian Scrub & Grassland 478](#_Toc532988278)

[M043. Californian Chaparral 485](#_Toc532988279)

[M044. Californian Coastal Scrub 488](#_Toc532988280)

[M045. Californian Annual & Perennial Grassland 492](#_Toc532988281)

[2.B.2. Temperate Grassland & Shrubland 495](#_Toc532988282)

[D141. Pampean Grassland & Shrubland 495](#_Toc532988283)

[M392. Semi-Arid Pampa Grassland & Shrubland 497](#_Toc532988284)

[M748. Humid Pampa Grassland & Shrubland 499](#_Toc532988285)

[D144. Patagonian Grassland & Shrubland 501](#_Toc532988286)

[M749. Patagonian Dry Grassland & Shrubland 503](#_Toc532988287)

[M750. Patagonian Mesic Grassland & Shrubland 505](#_Toc532988288)

[D023. Central North American Grassland & Shrubland 507](#_Toc532988289)

[M054. Central Lowlands Tallgrass Prairie 511](#_Toc532988290)

[M051. Great Plains Mixedgrass & Fescue Prairie 515](#_Toc532988291)

[M053. Western Great Plains Shortgrass Prairie 519](#_Toc532988292)

[M052. Great Plains Sand Grassland & Shrubland 525](#_Toc532988293)

[M158. Great Plains Comanchian Scrub & Open Vegetation 529](#_Toc532988294)

[D024. Eastern North American Grassland & Shrubland 531](#_Toc532988295)

[M506. Appalachian Rocky Felsic & Mafic Scrub & Grassland 536](#_Toc532988296)

[M509. Central Interior Acidic Scrub & Grassland 539](#_Toc532988297)

[M508. Central Interior Calcareous Scrub & Grassland 542](#_Toc532988298)

[M505. Laurentian-Acadian Acidic Rocky Scrub & Grassland 546](#_Toc532988299)

[M507. Laurentian-Acadian Calcareous Scrub & Grassland 550](#_Toc532988300)

[D022. Western North American Grassland & Shrubland 553](#_Toc532988301)

[M049. Southern Rocky Mountain Montane Shrubland 557](#_Toc532988302)

[M048. Central Rocky Mountain Montane-Foothill Grassland & Shrubland 560](#_Toc532988303)

[M168. Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow 566](#_Toc532988304)

[M172. Northern Vancouverian Lowland-Montane Grassland & Shrubland 571](#_Toc532988305)

[D061. Western North American Interior Chaparral 574](#_Toc532988306)

[M094. Cool Interior Chaparral 578](#_Toc532988307)

[M091. Warm Interior Chaparral 581](#_Toc532988308)

[D102. Southeastern North American Grassland & Shrubland 586](#_Toc532988309)

[M162. Florida Peninsula Scrub & Herb 589](#_Toc532988310)

[M309. Southeastern Coastal Plain Patch Prairie 593](#_Toc532988311)

[M308. Southern Barrens & Glade 597](#_Toc532988312)

[2.B.4. Temperate to Polar Scrub & Herb Coastal Vegetation 602](#_Toc532988313)

[D279. Pampean Dune & Coastal Grassland & Shrubland 602](#_Toc532988314)

[M755. Atlantic Coast & La Plata Delta Beach & Dune 604](#_Toc532988315)

[D281. Patagonian Dune & Coastal Grassland & Shrubland 606](#_Toc532988316)

[M757. Patagonian Coastal Grassland & Shrubland 607](#_Toc532988317)

[D026. Eastern North American Coastal Scrub & Herb Vegetation 609](#_Toc532988318)

[M060. Eastern North American Coastal Beach & Rocky Shore 615](#_Toc532988319)

[M057. Eastern North American Coastal Dune & Grassland 618](#_Toc532988320)

[D027. Pacific North American Coastal Scrub & Herb Vegetation 622](#_Toc532988321)

[M059. Pacific Coastal Beach & Dune 626](#_Toc532988322)

[M058. Pacific Coastal Cliff & Bluff 630](#_Toc532988323)

[2.C. Shrub & Herb Wetland 633](#_Toc532988324)

[2.C.1. Tropical Bog & Fen 633](#_Toc532988325)

[D259. Guianan Bog 633](#_Toc532988326)

[M706. Tepuyan Bog 635](#_Toc532988327)

[D260. Andean Montane Bog 636](#_Toc532988328)

[M708. Tropical Andes Upper Montane Bog 638](#_Toc532988329)

[2.C.2. Temperate to Polar Bog & Fen 640](#_Toc532988330)

[D282. Southern Andean Montane Bog 640](#_Toc532988331)

[M758. Southern Andean Montane Bog 642](#_Toc532988332)

[D283. Magellanian Bog & Fen 644](#_Toc532988333)

[M759. Magellanian Anti-Boreal Bog & Fen 645](#_Toc532988334)

[D029. North American Bog & Fen 647](#_Toc532988335)

[M876. North American Boreal & Subboreal Bog & Acidic Fen 650](#_Toc532988336)

[M877. North American Boreal & Subboreal Alkaline Fen 656](#_Toc532988337)

[M063. North Pacific Bog & Fen 660](#_Toc532988338)

[D324. Atlantic & Gulf Coastal Plain Pocosin 666](#_Toc532988339)

[M065. Southeastern Coastal Bog & Fen 669](#_Toc532988340)

[2.C.3. Tropical Freshwater Marsh, Wet Meadow & Shrubland 672](#_Toc532988341)

[D262. Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland 673](#_Toc532988342)

[M710. Caribbean Freshwater Marsh, Wet Meadow & Shrubland 674](#_Toc532988343)

[M711. Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland 677](#_Toc532988344)

[D263. Colombian-Venezuelan Freshwater Marsh, Flooded Savanna & Shrubland 679](#_Toc532988345)

[M715. Llanos Flooded Savanna 681](#_Toc532988346)

[D264. Guianan Freshwater Marsh, Wet Meadow & Shrubland 683](#_Toc532988347)

[M717. Central Guianan Flooded Savanna 685](#_Toc532988348)

[M718. Western Guianan Flooded Savanna & Shrubland 686](#_Toc532988349)

[M707. Orinoquian Floodplain Peat Meadow & Marsh 688](#_Toc532988350)

[M720. Orinoquian Floodplain Marsh & Flooded Savanna 690](#_Toc532988351)

[D265. Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland 692](#_Toc532988352)

[M863. Tropical Andean Pondshore & Wet Meadow 693](#_Toc532988353)

[M722. Andean Puna Wet Meadow 695](#_Toc532988354)

[M721. Northern Andean Wet Meadow 697](#_Toc532988355)

[D266. Amazonian Freshwater Marsh, Wet Meadow & Shrubland 699](#_Toc532988356)

[M709. Amazon Delta Peat Marsh 701](#_Toc532988357)

[M724. Amazonian-Guianan White Sand Flooded Savanna & Shrubland 703](#_Toc532988358)

[M726. Lower Amazon Wet Meadow & Shrubland 704](#_Toc532988359)

[M725. Upper Amazon Wet Meadow & Shrubland 706](#_Toc532988360)

[D267. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland 708](#_Toc532988361)

[M729. Pantanal Floodplain Wet Meadow & Shrubland 710](#_Toc532988362)

[M730. Parana Floodplain Wet Meadow & Shrubland 712](#_Toc532988363)

[M727. Cerrado Flooded Savanna 714](#_Toc532988364)

[M728. Beni Flooded Savanna 715](#_Toc532988365)

[D268. Chaco Freshwater Marsh, Flooded Savanna & Shrubland 717](#_Toc532988366)

[M734. Eastern Chaco Marsh & Flooded Savanna 719](#_Toc532988367)

[M732. Chaco Riparian Marsh & Shrubland 721](#_Toc532988368)

[2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland 723](#_Toc532988369)

[D284. South American Temperate Freshwater Marsh, Wet Meadow & Shrubland 723](#_Toc532988370)

[M760. Pampean Freshwater Marsh, Wet Meadow & Shrubland 725](#_Toc532988371)

[D031. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland 726](#_Toc532988372)

[M888. Arid West Interior Freshwater Marsh 730](#_Toc532988373)

[M074. Western North American Vernal Pool 734](#_Toc532988374)

[M073. Vancouverian Lowland Marsh, Wet Meadow & Shrubland 738](#_Toc532988375)

[M075. Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland 744](#_Toc532988376)

[D032. Southwestern North American Warm Desert Freshwater Marsh & Bosque 749](#_Toc532988377)

[M076. Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland 752](#_Toc532988378)

[D323. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland 754](#_Toc532988379)

[M061. Eastern North American Cool Temperate Seep 762](#_Toc532988380)

[M069. Eastern North American Marsh, Wet Meadow & Shrubland 767](#_Toc532988381)

[M881. Eastern North American Riverscour Vegetation 770](#_Toc532988382)

[M071. Great Plains Marsh, Wet Meadow, Shrubland & Playa 773](#_Toc532988383)

[D322. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland 776](#_Toc532988384)

[M066. Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh 782](#_Toc532988385)

[M067. Atlantic & Gulf Coastal Plain Wet Prairie & Marsh 787](#_Toc532988386)

[2.C.5. Salt Marsh 791](#_Toc532988387)

[D269. Eastern Pacific Coastal Salt Marsh 791](#_Toc532988388)

[M737. Mesoamerican-South American Pacific Coastal Salt Marsh 793](#_Toc532988389)

[M736. Mexican Pacific Coastal Salt Marsh 795](#_Toc532988390)

[D270. South American Lowlands Interior Brackish Marsh 796](#_Toc532988391)

[M738. Chaco-Espinal Brackish Marsh 798](#_Toc532988392)

[D271. Andean Salt Marsh 800](#_Toc532988393)

[M739. Central Andean Altiplano Salt Flats 801](#_Toc532988394)

[D272. South American Pacific Desert Salt Flats 803](#_Toc532988395)

[M740. South American Pacific Desert Salt Flats 805](#_Toc532988396)

[D285. South American Temperate Salt Marsh 807](#_Toc532988397)

[M762. South American Temperate Interior Brackish Marsh 808](#_Toc532988398)

[M763. Temperate & Austral Atlantic Coastal Salt Marsh 810](#_Toc532988399)

[M761. Southern Andean Montane Salt Marsh 812](#_Toc532988400)

[D033. North American Great Plains Saline Marsh 814](#_Toc532988401)

[M077. Great Plains Saline Wet Meadow & Marsh 816](#_Toc532988402)

[D034. North American Atlantic & Gulf Coastal Salt Marsh 818](#_Toc532988403)

[M079. North American Atlantic & Gulf Coastal Salt Marsh 822](#_Toc532988404)

[D035. Temperate & Boreal Pacific Coastal Salt Marsh 825](#_Toc532988405)

[M081. North American Pacific Coastal Salt Marsh 829](#_Toc532988406)

[D036. North American Western Interior Brackish Marsh, Playa & Shrubland 832](#_Toc532988407)

[M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland 837](#_Toc532988408)

[D037. Tropical Atlantic Coastal Salt Marsh 839](#_Toc532988409)

[M735. Tropical Western Atlantic-Caribbean Salt Marsh 841](#_Toc532988410)

[3. Desert & Semi-Desert 844](#_Toc532988411)

[3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland 844](#_Toc532988412)

[3.A.1. Tropical Thorn Woodland 844](#_Toc532988413)

[D287. Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland 844](#_Toc532988414)

[M765. Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland 846](#_Toc532988415)

[D288. Colombian-Venezuelan Xeromorphic Scrub & Woodland 847](#_Toc532988416)

[M766. Guajiran Xeromorphic Scrub & Woodland 849](#_Toc532988417)

[M767. Tumbesian Xeromorphic Scrub & Woodland 851](#_Toc532988418)

[D289. Interandean Valley Xeromorphic Scrub & Woodland 853](#_Toc532988419)

[M770. Bolivian-Tucuman Xeromorphic Scrub & Woodland 854](#_Toc532988420)

[M769. Central Andean Xeromorphic Scrub & Woodland 856](#_Toc532988421)

[M768. Northern Andean Xeromorphic Scrub & Woodland 858](#_Toc532988422)

[D290. Chaco Xeromorphic Scrub & Woodland 860](#_Toc532988423)

[M773. Southern Chaco Xeromorphic Scrub & Woodland 862](#_Toc532988424)

[M772. Northeastern Chaco Xeromorphic Scrub & Woodland 864](#_Toc532988425)

[M771. Northwestern Chaco Xeromorphic Scrub & Woodland 866](#_Toc532988426)

[3.A.2. Warm Desert & Semi-Desert Scrub & Grassland 868](#_Toc532988427)

[D291. Tropical Andean Xeromorphic Scrub & Grassland 868](#_Toc532988428)

[M777. Bolivian-Tucuman Interandean Xeromorphic Scrub & Grassland 869](#_Toc532988429)

[M776. Central Interandean Xeromorphic Scrub & Grassland 871](#_Toc532988430)

[M775. Northern Interandean Xeromorphic Scrub & Grassland 873](#_Toc532988431)

[D292. Brazilian-Parana Xeromorphic Scrub & Grassland 875](#_Toc532988432)

[M779. Caatinga Dense Scrub & Forb Meadow 877](#_Toc532988433)

[M778. Caatinga Xeromorphic Scrub 878](#_Toc532988434)

[D293. Chaco Xeromorphic Scrub, Grassland & Savanna 880](#_Toc532988435)

[M141. Chaco Xeromorphic Cliff & Other Rock Vegetation 882](#_Toc532988436)

[M781. Southern Chaco Xeromorphic Scrub & Savanna 884](#_Toc532988437)

[M780. Northern Chaco Xeromorphic Scrub & Savanna 886](#_Toc532988438)

[D294. South American Pacific Semi-Desert Scrub & Grassland 887](#_Toc532988439)

[M784. Chilean Mediterranean Coastal Semi-Desert Scrub & Grassland 889](#_Toc532988440)

[M785. Chilean Mediterranean Interior Semi-Desert Scrub & Grassland 891](#_Toc532988441)

[M861. Sechura Atacama Semi-Desert Cliff & Pavement 893](#_Toc532988442)

[M782. Sechura Atacama Semi-Desert Riparian Scrub 895](#_Toc532988443)

[M783. Sechura Atacama Semi-Desert Scrub 897](#_Toc532988444)

[D039. North American Warm Desert Scrub & Grassland 899](#_Toc532988445)

[M130. Tamaulipan Scrub & Grassland 902](#_Toc532988446)

[M086. Chihuahuan Desert Scrub 905](#_Toc532988447)

[M087. Chihuahuan Semi-Desert Grassland 912](#_Toc532988448)

[M088. Mojave-Sonoran Semi-Desert Scrub 919](#_Toc532988449)

[M089. Viscaino-Baja California Desert Scrub 926](#_Toc532988450)

[M117. North American Warm Semi-Desert Cliff, Scree & Rock Vegetation 929](#_Toc532988451)

[M092. North American Warm-Desert Xeric-Riparian Scrub 933](#_Toc532988452)

[M512. North American Warm Desert Ruderal Scrub & Grassland 936](#_Toc532988453)

[3.B. Cool Semi-Desert Scrub & Grassland 940](#_Toc532988454)

[3.B.1. Cool Semi-Desert Scrub & Grassland 940](#_Toc532988455)

[D318. Andean Cool Semi-Desert Cliff, Scree & Other Rock Vegetation 940](#_Toc532988456)

[M862. Andean Cool Semi-Desert Rock Vegetation 942](#_Toc532988457)

[D117. Patagonian Cool Semi-Desert Scrub & Grassland 943](#_Toc532988458)

[M790. Patagonian Semi-Desert Scrub 945](#_Toc532988459)

[D295. Tropical Andean Cool Semi-Desert Scrub & Grassland 947](#_Toc532988460)

[M787. Xeric Puna Succulent Scrub 949](#_Toc532988461)

[D296. Mediterranean-Southern Andean Cool Semi-Desert Scrub & Grassland 951](#_Toc532988462)

[M788. Mediterranean Andean Cool Semi-Desert Scrub & Grassland 952](#_Toc532988463)

[M789. Monte Cool Semi-Desert Scrub & Grassland 954](#_Toc532988464)

[D040. Western North American Cool Semi-Desert Scrub & Grassland 956](#_Toc532988465)

[M171. Great Basin-Intermountain Dry Shrubland & Grassland 961](#_Toc532988466)

[M170. Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland 966](#_Toc532988467)

[M169. Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland 971](#_Toc532988468)

[M095. Great Basin-Intermountain Xeric-Riparian Scrub 977](#_Toc532988469)

[M093. Great Basin Saltbush Scrub 979](#_Toc532988470)

[M118. Intermountain Basins Cliff, Scree & Badland Sparse Vegetation 985](#_Toc532988471)

[4. Polar & High Montane Scrub, Grassland & Barrens 988](#_Toc532988472)

[4.A. Tropical High Montane Scrub & Grassland 988](#_Toc532988473)

[4.A.1. Tropical High Montane Scrub & Grassland 989](#_Toc532988474)

[D298. Tropical & Mediterranean Andean High Montane Scrub & Grassland 989](#_Toc532988475)

[M794. High Andean Xeric Puna Bunch Grassland 990](#_Toc532988476)

[M793. High Andean Moist Puna Bunch Grassland 992](#_Toc532988477)

[M792. High Northern Andean Super-Paramo 994](#_Toc532988478)

[4.B. Temperate to Polar Alpine & Tundra Vegetation 996](#_Toc532988479)

[4.B.1. Temperate & Boreal Alpine Tundra 996](#_Toc532988480)

[D299. Southern Andean High Montane Tundra 996](#_Toc532988481)

[M795. Southern Andean Alpine Tundra 998](#_Toc532988482)

[D300. Magellanian High Montane Tundra 1000](#_Toc532988483)

[M796. Magellanian Montane Tundra 1002](#_Toc532988484)

[D042. Eastern North American Alpine Tundra 1003](#_Toc532988485)

[M131. Eastern North American Alpine Tundra 1008](#_Toc532988486)

[D043. Western North American Alpine Tundra 1010](#_Toc532988487)

[M099. Rocky Mountain-Sierran Alpine Tundra 1015](#_Toc532988488)

[M101. Vancouverian Alpine Tundra 1020](#_Toc532988489)

[5. Aquatic Vegetation 1024](#_Toc532988490)

[5.A. Saltwater Aquatic Vegetation 1024](#_Toc532988491)

[5.A.2. Benthic Macroalgae Saltwater Vegetation 1024](#_Toc532988492)

[D047. Temperate Intertidal Shore 1024](#_Toc532988493)

[M106. Temperate Pacific Seaweed Intertidal Vegetation 1027](#_Toc532988494)

[5.A.3. Benthic Vascular Saltwater Vegetation 1029](#_Toc532988495)

[D064. Temperate Seagrass Aquatic Vegetation 1029](#_Toc532988496)

[M184. Temperate Pacific Seagrass Intertidal Vegetation 1034](#_Toc532988497)

[5.B. Freshwater Aquatic Vegetation 1036](#_Toc532988498)

[5.B.1. Tropical Freshwater Aquatic Vegetation 1036](#_Toc532988499)

[D097. Neotropical Freshwater Aquatic Vegetation 1036](#_Toc532988500)

[M291. Neotropical Floating & Submerged Freshwater Marsh [Low - Poorly Documented] 1037](#_Toc532988501)

[5.B.2. Temperate to Polar Freshwater Aquatic Vegetation 1039](#_Toc532988502)

[D319. Temperate South American Freshwater Aquatic Vegetation 1039](#_Toc532988503)

[M865. Temperate South American Freshwater Aquatic Vegetation 1041](#_Toc532988504)

[D049. North American Freshwater Aquatic Vegetation 1043](#_Toc532988505)

[M109. Western North American Freshwater Aquatic Vegetation 1045](#_Toc532988506)

[6. Open Rock Vegetation 1049](#_Toc532988507)

[6.A. Tropical Open Rock Vegetation 1049](#_Toc532988508)

[6.A.1. Tropical Cliff, Scree & Other Rock Vegetation 1049](#_Toc532988509)

[D311. Brazilian-Parana Cliff, Scree & Rock Vegetation 1049](#_Toc532988510)

[M867. Brazilian-Parana Cliff, Scree & Rock Vegetation 1051](#_Toc532988511)

[D310. Guianan Montane Cliff, Scree & Rock Vegetation 1053](#_Toc532988512)

[M851. Tepuyan Cliff, Scree & Rock Vegetation 1054](#_Toc532988513)

[D312. Tropical Andean Cliff, Scree & Rock Vegetation 1056](#_Toc532988514)

[M855. Bolivian-Tucuman Cliff, Scree & Rock Vegetation 1058](#_Toc532988515)

[M853. Northern Andean Cliff, Scree & Rock Vegetation 1060](#_Toc532988516)

[M856. Moist Puna Cliff, Scree & Rock Vegetation 1061](#_Toc532988517)

[6.B. Temperate & Boreal Open Rock Vegetation 1063](#_Toc532988518)

[6.B.1. Temperate & Boreal Cliff, Scree & Other Rock Vegetation 1063](#_Toc532988519)

[D051. Eastern North American Temperate Cliff, Scree & Rock Vegetation 1063](#_Toc532988520)

[M111. Eastern North American Cliff & Rock Vegetation 1066](#_Toc532988521)

[M116. Great Plains Cliff, Scree & Rock Vegetation 1069](#_Toc532988522)

[M115. Great Plains Badlands Vegetation 1072](#_Toc532988523)

[D052. Western North American Temperate Cliff, Scree & Rock Vegetation 1074](#_Toc532988524)

[M887. Western North American Cliff, Scree & Rock Vegetation 1077](#_Toc532988525)

1. Forest & Woodland

Tropical, temperate and boreal forests, woodlands and tree savannas characterized by broadly mesomorphic (including scleromorphic) tree growth forms (including *broad-leaved, needle-leaved, sclerophyllous, palm, bamboo trees*, and *tree ferns*), typically with at least 10% cover (but tropical tree savannas up to 40% cover, when trees <8 m tall), irregular horizontal spacing of vegetation structure, and spanning humid to seasonally dry tropical to boreal and subalpine climates and wet to dry substrate conditions. Includes native forests, as well as managed, and some plantation forests where human management is infrequent.

1.A. Tropical Forest & Woodland

Tropical forests found at lowland and montane elevations including tropical dry forests, and lowland to montane humid forests (tropical rainforests) and tropical forested wetlands, where frost is essentially absent at sea level.

1.A.1. Tropical Dry Forest & Woodland

Tropical Dry Forest & Woodland is dominated by broad-leaved drought-deciduous, semi-deciduous, and small-leaved or sclerophyllous evergreen trees where rainfall is lower, often associated with more strongly seasonal, tropical climates, rainshadows, or drying winds. At continental scales, the largest areas occur between 10° and 23°N and S latitude.

1. Forest & Woodland

1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland

D099. Caribbean-Mesoamerican Dry Forest & Woodland

Type Concept Sentence: This division includes seasonally drought-deciduous to semi-deciduous tropical forests distributed from sea level up to 1400 m elevation throughout the Caribbean Basin, southern Gulf of Mexico, and in the Pacific Basin from the Gulf of California through Panama.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.1.Ea. Tropical Dry Forest & Woodland (F003)

Elcode: D099

\*Scientific Name: *Bursera simaruba - Enterolobium cyclocarpum - Ceiba aesculifolia* Dry Forest & Woodland Division

\*Common (Translated Scientific) Name: Gumbo Limbo - Elephant Ear - Pochote Dry Forest & Woodland Division

\*Colloquial Name: Caribbean-Mesoamerican Dry Forest & Woodland

\*Type Concept: This division includes tropical forests characterized by a dry season of several months, and found close to the coast or in interior valleys throughout Mexico, Central America, and the Caribbean Basin. Forests tend to have low stature (5-15 m height), high density of small and medium-sized trees, and typically have a single layer, with somewhat open canopies and no emergent trees. The herb layer may be poorly developed or completely lacking. Floristic diversity is low compared to more humid tropical forests, and a few species may dominate the stands. The following list of species are among those that are diagnostic for this division: *Astronium graveolens, Bombacopsis quinata, Bursera simaruba, Bursera excelsa, Bursera fagaroides var. elongata, Bursera instabilis, Bursera morelensis, Calycophyllum candidissimum, Ceiba aesculifolia, Ceiba acuminata, Celtis ehrenbergiana, Coccoloba diversifolia, Conzattia sericea, Enterolobium cyclocarpum, Erythroxylum areolatum, Eugenia axillaris, Exostema caribaeum, Exothea paniculata, Guazuma ulmifolia, Guettarda krugii, Guaiacum sanctum, Guapira obtusata, Gymnanthes lucida, Hypelate trifoliata, Jarilla heterophylla, Krugiodendron ferreum, Maclura tinctoria, Metopium toxiferum, Plumeria obtusa, Sideroxylon foetidissimum, Sideroxylon salicifolium, Martinella obovata*, and *Tabebuia ochracea*. Variation in the dry season period, topography, and substrate determine the specific characteristics of the vegetation types in this division since all of these have great importance in dry forests as determinants of variation in water availability. Seasonal climates with 600-1500 mm rainfall per year and the dry season of two to several months are characteristic. These forests most typically occur in sandy lowlands, littoral or sub-littoral flatlands with rock outcrops and higher terraces facing the sea, karstic flats, towerlike karstic hills, humic carbonate soils, and shallow red ferrallitic soils. These forests tend to occur adjacent and/transitional to more humid submontane tropical forests, or towards more xeric tropical thornscrub vegetation types.

\*Diagnostic Characteristics: Seasonally deciduous and semi-deciduous forest occurring in tropical latitudes of Mexico, the Gulf of Mexico, Central America, and Caribbean Basin. Species diagnostic for this division include *Astronium graveolens, Bombacopsis quinata, Bursera simaruba, Bursera excelsa, Bursera fagaroides var. elongata, Bursera instabilis, Bursera morelensis, Calycophyllum candidissimum, Ceiba aesculifolia, Ceiba acuminata, Celtis ehrenbergiana, Coccoloba diversifolia, Conzattia sericea, Enterolobium cyclocarpum, Erythroxylum areolatum, Eugenia axillaris, Exostema caribaeum, Exothea paniculata, Guazuma ulmifolia, Guettarda krugii, Guaiacum sanctum, Guapira obtusata, Gymnanthes lucida, Hypelate trifoliata, Jarilla heterophylla, Krugiodendron ferreum, Maclura tinctoria, Martinella obovata, Metopium toxiferum, Plumeria obtusa, Sideroxylon foetidissimum, Sideroxylon salicifolium*, and *Tabebuia ochracea*.

\*Classification Comments: Owing to extensive land conversion and degradation (e.g., from livestock grazing), there remains much ambiguity and unevenness in documentation of this division. More work is needed to fully differentiate this type from slightly more humid and evergreen-dominant, more xeric thornscrub, and tropical *Quercus*-dominated woodland vegetation types.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: These forests have low stature (5-15 m; extremes up to 25 m height), high density of small and medium-sized trees, and typically have single-layer, somewhat open canopies with no emergent trees. Forests in the humid end of the range are semi-deciduous and taller (up to 20-25 m high), while the forests that grow in areas of lower rainfall are nearly 100% deciduous and generally have a lower height and more open canopy below 15 m. The herb layer may be poorly developed or completely lacking. The dry forests of south Florida and the Caribbean tend to have a greater density of individual stems and shorter canopy heights than tropical dry forests in the mainland Neotropics. Density varies from 14,000 stems >2.5 cm/ha in Puerto Rico dry forest to 4600 stems/ha in Florida (Gillespie 2006, Lugo et al. 2006). Drought-deciduousness is the principal adaptive mode of tropical dry deciduous forests, and at the dry extremes, small evergreen trees are important (Lugo et al. 2006). In the Caribbean, the canopy is seasonally open; there are some truly deciduous species in these forests, with early-successional forests dominated by broadleaf semi-deciduous species and late-successional forests dominated by broadleaf evergreen species. Also in the Caribbean, there tends to be a notable lack of lianas compared with dry forests in the mainland Neotropics (Gillespie 2006). Despite relatively low species diversity, high lifeform diversity is common and is accompanied by diversity in plant habit, leaf size and structure, drought tolerance and growth seasonality; this diversity is attributed to habitat heterogeneity coupled with strong rainfall seasonality (Lugo et al. 1978, Medina 1995, as cited in Lugo et al. 2006). Epiphytic orchid and bromeliad species are often found in areas where frosts or anthropogenic disturbances have not occurred in a long time. During the dry season there is an accumulation of litter because much vegetation is deciduous (Holbrook et al. 1995) and sunlight penetrates to the forest floor which reduces the rate of decomposition by decreasing the relative soil moisture (Pennington et al. 2006). The floral and fruiting phenology is highly seasonal and many species flower synchronously during the transition between the dry season and the rainy season when the trees are still leafless (Bullock et al. 1995). Where these forests occur on karst, they are characterized by trees of small diameter, high tree density, and leaf scleromorphy. These stands have a tendency to show signs of being exposed to frequent drought conditions. This is probably due to the rapid rate of runoff and infiltration of rainwater, low water storage in shallow soils, and high sunlight. But this varies depending on the landscape position and the substrate. For example, at the base of limestone "mogotes" or towerlike "haystack mountains" the vegetation may quickly transition to mesic, closed canopy of evergreen species 25-30 m tall, while on sideslopes and tops the vegetation is a deciduous woodland with trees of 16-18 m height and sclerophyllous leaves. In Cuban mogotes, the slope forest has a 10- to 16-m high open canopy of deciduous trees with barrel-like trunks and abundant columnar cacti, but can quickly grade to a shrubland dominated by terrestrial bromeliads and diverse sclerophyllous shrubs and trees.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The following list of species are among those that are diagnostic for this division: *Astronium graveolens, Bombacopsis quinata, Bursera simaruba, Bursera fagaroides var. elongata (= Bursera odorata), Bursera instabilis, Bursera morelensis, Calycophyllum candidissimum, Ceiba aesculifolia, Ceiba acuminata, Celtis ehrenbergiana (= Celtis pallida), Coccoloba diversifolia, Conzattia sericea, Enterolobium cyclocarpum, Erythroxylum areolatum, Eugenia axillaris, Exostema caribaeum, Exothea paniculata, Guazuma ulmifolia, Guettarda krugii, Guaiacum sanctum, Guapira obtusata, Gymnanthes lucida, Hypolate trifoliate, Jarilla heterophylla (= Jarilla chocola), Krugiodendron ferreum, Maclura tinctoria, Martinella obovata (= Tabebuia cordata), Metopium toxiferum, Pinus elliottii var. densa, Plumeria obtusa, Sideroxylon foetidissimum, Sideroxylon salicifolium*, and *Tabebuia ochracea*. Characteristic pine species in the Caribbean include *Pinus caribaea* (*var. bahamensis, var. caribaea*, and *var. hondurensis*), and *Pinus tropicalis*. Diagnostic shrubs include *Chrysobalanus icaco, Coccothrinax argentata, Ilex cassine, Sideroxylon salicifolium, Tetrazygia bicolor*, and *Thrinax morrisii*. Similar open pine forests occur in the northern Bahama Archipelago and along the coast in western and eastern Cuba where they are known as pine barrens or pine woodlands and are dominated by *Pinus caribaea, Pinus tropicalis*, and *Pinus cubensis*, respectively, accompanied by a similar set of species such as the palms *Coccothrinax argentata, Coccothrinax miraguana, Coccothrinax orientalis*, among others. Given the harsh conditions of the Antillean dry forests, those relatively few species that thrive under the stress are able to dominate sites (Lugo et al. 2006). Dominant species in Puerto Rico coastal dry forest are *Coccoloba krugii, Erithalis fruticosa, Exostema caribaeum, Guettarda krugii, Gymnanthes lucida, Pisonia albida, Savia sessiliflora*, and *Thouinia striata var. portoricensis*. Endemism in these Caribbean forests is very high and represents about 50% of the characteristic plant species.

The division also includes pine-oak dry forests in western Cuba, where the oak species *Quercus oleoides* also occurs in southern Mexico and Central America. Mesoamerican dry forests occur on soils of variable depth, texture, and alkalinity, and typically have a closed canopy 10-25 m high depending on the type and nutrient contents of the soil. A moderate to high diversity of tropical deciduous tree species dominate the multi-tiered tree canopy. The structure and composition vary along the large distributional range, which includes mountainous topographies that influence moisture availability and soil characteristics. Characteristic genera include *Astronium, Bursera, Ceiba, Cassia, Calycophyllum, Cochlospermum, Cordia, Enterolobium, Ficus, Gyrocarpus, Lysiloma, Plumeria, Platymiscium, Pterocarpus, Thouinidium, Zanthoxylum*, among others. At the northwestern extreme in Sinaloa, Mexico, these forests include *Conzattia sericea, Jarilla heterophylla, Bursera inopinnata, Ceiba acuminata, Martinella obovata, Ipomoea arborescens, Lysiloma watsonii, Choclosperma vitifolium, Pachycereus pecten-aboriginum, Stenocereus thurberi, Mardensia edulis, Senna bicapsularis (= Cassia emarginata)*, and *Tillandsia inflata*. Further south from Jalisco through Oaxaca, common species include *Achatocarpus oaxacanus, Aphipterygium glaucum, Bombax ellipicum, Bombax palmeri, Bursera fagaroides, Bursera instabilis, Bursera longipes, Bursera morelensis, Bursera fagaroides var. elongata, Ceiba aesculifolia, Coccoloba* spp., *Pseudosmodingium perniciosum*, and *Tabebuia palmeri*. Dry inter-montane valleys of south-central Mexico (e.g., Balsas dry forest) include *Agave pedunculifera, Bursera ariensis, Bursera diversifolia, Bursera hintonii, Ceiba aesculifolia, Cochlospermum vitifolium, Conzattia multiflora, Cordia elaeagnoides, Cyrtocarpa procera, Ficus cotinifolia, Ficus goldmanii, Ficus kellermanni, Ficus petiolaris, Haematoxylon brasiletto, Heliocarpus reticulatus, Lysiloma divaricatum, Pterocarpus orbiculatus, Ruprechtia fusca, Tabebuia impetiginosa*, and *Vitex pyramidata*. Throughout the northern Yucatán Peninsula, most of its distribution is related to limestone outcrops of coral origin, up to hilly terrain and supports a seasonal climate with low annual rainfall. Characteristic species include *Beaucarnea pliabilis, Caesalpinia gaumeri, Caesalpinia vesicaria, Diospyros cuneata, Guaiacum sanctum, Hampea trilobata, Lemaireocereus griseus, Lemairocereus aragonii, Lysiloma latisiliquum, Manilkara sapota, Parmentiera aculeata, Plumeria obtusa, Pseudophoenix* sp., and *Pterocereus gaumeri*. Further south along the Pacific Central American coast, extending to the Azuero Peninsula of Panama, characteristic species include *Acacia collinsii, Adenocalymma inundatum, Albizia caribea, Allophyllus occidentalis, Andira inermis, Apeiba* spp., *Ardisia revoluta, Arrabidaea mollissima, Astronium graveolens, Bauhinia glabra, Bombacopsis quinata, Bursera simaruba, Calycophyllum candidissimum, Casearia arguta, Cedrela odorata, Ceiba aesculifolia, Chomelia spinosa, Cochlospermum vitifolium, Combretum farinosum, Cydista diversifolia, Enterolobium cyclocarpum, Exostema mexicanum, Ficus* spp., *Genipa americana, Guaiacum sanctum, Guarea excelsa, Guazuma ulmifolia, Gyrocarpus americanus, Hemiangium excelsum, Jacquinia pungens, Lonchocarpus phaseolifolius, Lonchocarpus phlebophyllus, Luehea candida, Maclura tinctoria, Platymiscium pleiostachyum, Sabal allenii, Sideroxylon capiri (= Mastichodendron capiri), Simarouba amara, Simarouba glauca, Spondias mombin, Stemmadenia obovata, Sterculia apetala, Swietenia humilis, Swietenia macrophylla, Tabebuia ochracea, Thouinidium decandrum, Trichilia colimana*, and *Zanthoxylum setulosum*.

Naturalized species that may be common or may dominate ruderal dry forests include *Vachellia farnesiana (= Acacia farnesiana), Leucaena leucocephala, Melicoccus bijugatus, Parkinsonia aculeata, Prosopis juliflora*, and *Tamarindus indica*. Some of the most widespread exotic trees and shrubs in Puerto Rico and the Virgin Islands are *Albizia lebbeck, Leucaena leucocephala, Pinus caribaea, Schinus molle, Spathodea campanulata, Syzygium jambos, Tabebuia rosea*, and *Terminalia catappa* (Brandeis et al. 2009b, Chinea and Helmer 2009).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Caribbean and Mesoamerican dry forests tend to be exposed to harsh environmental conditions that, depending on their intensity, can cause damage or diebacks, such as seasonal water deficit, nutrient stress, hurricane-force winds and salt spray, and saltwater storm surge. This has influenced the development of structural and physiological mechanisms, making them resilient to disturbance. Among the more outstanding ones are a high resistance to wind (short stature), a high proportion of root biomass, high soil carbon and nutrient accumulation below ground, the ability of most tree species to resprout, and high nutrient use efficiency (Lugo et al. 2006). Fire is not thought to be part of the natural dynamics of these dry forests, but hurricanes often are, which naturally results in considerable heterogeneity in habitat structure and food availability on small spatial scales. This structuring of coastal dry forest by frequent natural disturbance may favor their resilience to anthropogenic disturbance and fragmentation.

ENVIRONMENT

Environmental Description: This division includes tropical forests characterized by a dry season of several months occurring close to the coast or in interior valleys throughout Mexico, Central America, the Caribbean Basin, and south Florida. There, mean annual temperatures in the area of distribution range from 23°C (74°F) in the north to 26°C (77°F) in the Lower Keys. Caribbean dry forests occurring on the mainland in Florida and the Upper Keys are periodically exposed to short-term frost and their flora is composed of a subset of native tropical trees that can withstand rare frost events. Mean annual temperature in the West Indies distribution is around 25°C. Precipitation primarily occurs from May or June to October and ranges from 1650 mm along the Atlantic coast decreasing southward to less than 1000 mm in the Lower Keys (Gillespie 2006). Annual precipitation in the distributional range of this forest in Cuba is less than 1500 mm in the west part of the range and increases towards the east. Precipitation in the distribution range of this forest in Puerto Rico and over most of the islands of Culebra and Vieques ranges from 600 to 1100 mm per year (Brandeis et al. 2006), with two dry seasons, the longer one from December to April and a shorter one from June to August. Throughout Mexico and Central America, these seasonally dry deciduous to semi-deciduous forests are distributed from sea level up to 1400 m elevation in the Pacific basin from Mexico to Panama. Precipitation generally varies from 600 to 1600 mm/year and annual mean temperatures are over 24°C. These forests experience at least one distinct dry season of 4-6 months/year.

Dry forests may often be exposed to highly stressful conditions given the combination of environmental features such as low moisture availability, long dry seasons, decadal cycles of pronounced drought, wind exposure and salt spray in littoral locations. These forests are also periodically exposed to hurricane conditions, with effects that span from flooding with seawater to defoliation, treefall and other structural changes due to strong winds.

Limestone is the dominant substrate in Caribbean dry forests, and in the Yucatán Peninsula of Mexico, with skeletal organic soils with minor mineral components, rarely exceeding 20 cm in depth (Snyder et al. 1990, cited in Gillespie 2006). In the Greater Antilles the distribution of dry forests is indicative of limestone substrates occurring in narrow strips on the northern and southern coastal areas. These also include karst formations with steep slopes and plateaus of towerlike karstic hills up to 300-600 m elevation, with bare karstic rock or more-or-less eroded skeletal soils, or limestone cliffs, and the narrow valleys and gorges in between. Rocky limestone soils have low water-holding capacity and nutritional limitations imposed by their calcareous composition. In flat low-lying limestone archipelagos, such as the Bahamas, the Cayman Islands, Mona and Anegada, dry forests and shrublands dominate. In volcanic, low mountainous islands of the Lesser Antilles, dry forests dominate except for protected sites and ravines where moist forest can grow (Lugo et al. 2006). In Cuba, the dry pine forests are found primarily on acidic soils that have little water-retention capacity and are poor in essential elements. The principal soil types on which they occur are quartziferous sands, pseudo-spodosols in the west and lateritic soils in the east. Only pine trees, which have an ectomycorrhizal symbiosis with fungi, are capable of obtaining in this way a sufficient amount of nutrients to achieve the size of trees. In the Bahamas, pine rockland occurs on relatively flat, moderately to well-drained terrain, from 2-7 m above sea level (Snyder et al. 1990). The oolitic limestone is at or very near the surface, and there is very little soil development. Soils are generally composed of small accumulations of nutrient-poor sand, marl, clayey loam, and organic debris in depressions and crevices in the rock surface. Drainage varies according to the porosity of the limestone substrate, but is generally rapid. Consequently, most sites are wet for only short periods following heavy rains. During the rainy season, however, some sites may be shallowly inundated by slow-flowing surface water for up to 60 days each year (FNAI 2010a).

Dry forests throughout Mexico and Central America occur across a wider diversity of local climate conditions, landforms, and substrates than in the Caribbean. In Tamaulipas, Mexico, these forests occur across lower elevation slopes of the eastern Sierra Madre Oriental, Sierra de San Carlos, Sierra de Tamaulipas, and plateaus of northeastern Mexico. In Sinaloa they are found in canyons and steep slopes with thin, sandy soils. These areas typically experience two wet seasons (winter and mid-summer) and two dry seasons each year. This favors deciduous plant species with well-developed root storage systems, able to rapidly respond to wet seasons. In Nayarit these forests occur at elevations from sea level up through 1,300m, always on slopes. These forests occur on soils of variable depth, texture, and alkalinity. Throughout Guerrero they are found in canyons and steep slopes with soils that are shallow, sandy, nutrient poor, and have low water holding capacity. These areas (extending south through Central America) typically experience one distinct wet season (July-November) and one dry season (December-June) each year. In Guerrero, this vegetation occurs between 0 - 900 m elevation with mean annual precipitation varying between 400-1200 mm, and mean annual temperature around 25<sup>o</sup>C. These communities transition into thorn scrub at the drier end of its gradient along lower elevation borders, and to semi-evergreen forest further upslope or at the valley bottoms. In the Motagua Valley of Guatemala, and nearby valleys in Honduras, this vegetation usually occurs on deep, rich soils with annual rainfall between 1000 and 1500 mm, but can reach up to 2000 mm and an average temperature of 24<sup>o</sup>C. With increasing elevation surrounding these valleys, there is an abrupt transition to premontane wet forests. Throughout the remaining Pacific coast of Central America, these forests grow on a variety of soils and topography, with substrates often derived from volcanic activity or from limestones or sandstones. In general, these tend to be more fertile soils than in other parts of the range of this division. Weather conditions that characterize this southerly range are more constant, with an average annual precipitation ranging up to 2000 mm, always with a dry season of 4-6 months, but the exact period varies according to locality.

DISTRIBUTION

\*Geographic Range: This division is found throughout the Caribbean, south Florida, Caribbean coastal South America, Gulf Coast of Mexico and Pacific Coast of Mexico and Central America.

Nations: BS, BZ, CO, CR, CU, DO, GT, HN, HT, JM, KN, MQ, MX, NI, PA, PR, SV, TC, TT, US, VE, VG?, VI, XC, XD

States/Provinces: FL

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M296 | Caribbean-Mesoamerican Pine Dry Forest |
| M134 | Caribbean Coastal Lowland Dry Forest |
| M294 | Caribbean Dry Limestone Forest |
| M561 | Caribbean-Mesoamerican Seasonal Dry Forest |
| M562 | Pacific Mesoamerican Seasonal Dry Forest |
| M514 | Caribbean Ruderal Dry Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse and P. Comer, in Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: P. Comer and C. Josse

Acknowledgments [optional]: J. Franklin

Version Date: 07 Jan 2016

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1. Forest & Woodland

1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland

M296. Caribbean-Mesoamerican Pine Dry Forest

Type Concept Sentence: This macrogroup is characterized by forests that include in their composition either pine or oak species growing alongside other broadleaf species in tropical lowland, seasonally dry settings, with additional soil moisture due to the substrate composition. Natural communities within this macrogroup are distributed in the southern Florida Peninsula and the Florida Keys, the Bahamian Archipelago, Cuba, the Gulf and Caribbean coast of Mexico, reaching south into Costa Rica. The south Florida slash pine forest or pine rockland is the community represented in Florida and is characterized by an open canopy of *Pinus elliottii var. densa* with a patchy understory of tropical and temperate shrubs and palms and a rich herbaceous layer of mostly perennial species, including numerous species endemic to southern Florida.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland (D099)

Elcode: M296

\*Scientific Name: *Coccothrinax argentata - Pinus elliottii var. densa - Pinus caribaea* Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Florida Silver Palm - Florida Slash Pine - Caribbean Pine Dry Forest Macrogroup

\*Colloquial Name: Caribbean-Mesoamerican Pine Dry Forest

\*Type Concept: This macrogroup encompasses tropical and subtropical forests of open to semi-open canopy, 8-12 m tall, characterized by a diverse shrub/subcanopy layer composed of species of palm and hardwood mostly of Caribbean floristic affinity. The uniqueness of the flora associated with the South Florida Slash Pine forest has long been recognized; it has been estimated that nearly one-third of the taxa found in this type are restricted to it, including half of southern Florida's endemic plants. Shrubs include *Chrysobalanus icaco, Coccothrinax argentata, Ilex cassine, Sideroxylon salicifolium, Tetrazygia bicolor*, and *Leucothrinax morrisii*. More common and representative (if not diagnostic) species on the mainland and Florida Keys include *Byrsonima lucida, Dodonaea viscosa, Guettarda elliptica, Guettarda scabra*, and *Serenoa repens*. Similar open pine forests occur in the northern Bahama Archipelago and along the coast in western and eastern Cuba where they are known as pine barrens or pine woodlands and are dominated by *Pinus caribaea, Pinus tropicalis*, and *Pinus cubensis*, respectively, accompanied by a similar set of species such as the palms *Coccothrinax argentata, Coccothrinax miraguana, Coccothrinax orientalis, Coccothrinax yuraguana*, and *Leucothrinax morrisii*. Other species include *Rhus copallinum, Tabebuia bahamensis, Tabebuia dubia, Tabebuia lepidophylla, Tabebuia shaferi, Zamia pumila*, and species of *Byrsonima, Guettarda*, and *Tetrazygia*. The macrogroup also includes pine-oak dry forests in western Cuba, where the oak species *Quercus oleoides* also occurs in the Dry Evergreen Oak forest type distributed in Mesoamerica and included in the macrogroup.

~South Florida Slash Pine Rockland Group (G005)$$ is a pyrogenic community, a defining characteristic shared by all the other community types within the macrogroup, especially those dominated by pine species. In general, forests in this macrogroup experience a dry season of several months. Specific communities can be dry-mesic or xeric depending on landscape position and substrate. The macrogroup occurs in lowlands and low hills, littoral or sub-littoral flatlands on limestone or on thin sandy soils over limestone, or on light gray quartz sand or soils derived from sandstone or serpentine bedrock in the case of communities in Cuba. All these different substrates are nutrient-poor and drain very rapidly. Consequently, most sites are wet for only short periods following heavy rains.

\*Diagnostic Characteristics: *Pinus elliottii var. densa* is the dominant and characteristic canopy tree and is nearly always present in stands of the Florida pine rockland type; other pine species are characteristic in other parts of the distribution of the type. Diagnostic tropical shrubs include *Coccothrinax argentata, Leucothrinax morrisii, Sideroxylon salicifolium, Chrysobalanus icaco, Ilex cassine*, and *Tetrazygia bicolor*. Different shrubs are found on the Miami Ridge than in the Florida Keys. *Leucothrinax morrisii* is a typical shrub only in the Florida Keys and together with *Coccothrinax argentata* are shared understory species with the Cuban and Bahamian pine woodlands. More common and representative (if not diagnostic) species on the mainland and Florida Keys include *Byrsonima lucida, Dodonaea viscosa, Guettarda elliptica, Guettarda scabra*, and *Serenoa repens*.

\*Classification Comments: This description is best developed for the Florida part of the range and further work is needed to make it a more comprehensive rangewide description. The Florida communities bear a strong resemblance to the rocky pinelands in the Caribbean, particularly in the eastern Bahamian Archipelago on Grand Bahama, Abaco, New Providence, and Andros islands. These Bahamian pinelands have a canopy of *Pinus caribaea var. bahamensis*, but are similar to the South Florida types in substrate, physiognomy, and tropical understory species (Snyder et al. 1990). The southwestern Florida *Pinus elliottii var. densa*-dominated flatwoods on sands not influenced by limestone are not included in this macrogroup. The flatwoods tend to have *Serenoa repens*, an evergreen palm, as a common low shrub, and *Aristida beyrichiana* as a common grass. The flatwoods lack the tropical broadleaf evergreen shrubs characteristic of the pine rockland.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The slash pine forest in this macrogroup is characterized by an open canopy, generally with multiple age classes, of the needle-leaved evergreen conifer *Pinus elliottii var. densa*, associated with a high diversity of palms, hardwoods and herbaceous plants in the understory, most derived from the tropical flora of the West Indies (Snyder et al. 1990). Many of these species vary in height depending on fire frequency, getting taller with time since fire (FNAI 2010a).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Pinus elliottii var. densa* is the characteristic and often dominant pine species of the macrogroup distribution in the continental United States. Characteristic pine species in the communities further south and in the Caribbean include *Pinus caribaea* (*var. bahamensis, var. caribaea*, and *var. hondurensis*), and *Pinus tropicalis*. It has been estimated that nearly one-third of the taxa found in the south Florida pine rockland are restricted to it, including half of southern Florida's endemic plants (Stout and Marion 1993). Shrubs include *Chrysobalanus icaco, Coccothrinax argentata, Ilex cassine, Sideroxylon salicifolium, Tetrazygia bicolor*, and *Leucothrinax morrisii (= Thrinax morrisii)*. More common and representative (if not diagnostic) species on the mainland and Florida Keys include *Byrsonima lucida, Dodonaea viscosa, Guettarda elliptica, Guettarda scabra*, and *Serenoa repens*. Similar open pine forests occur in the northern Bahama Archipelago and along the coast in western and eastern Cuba where they are known as pine barrens or pine woodlands and are dominated by *Pinus caribaea, Pinus tropicalis*, and *Pinus cubensis*, respectively, accompanied by a similar set of species such as the palms *Coccothrinax argentata, Coccothrinax miraguana, Coccothrinax orientalis, Coccothrinax yuraguana*, and *Leucothrinax morrisii*. Other species include *Byrsonima lucida, Dodonaea viscosa, Guettarda elliptica, Guettarda scabra, Rhus copallinum, Serenoa repens, Tabebuia bahamensis, Tabebuia dubia, Tabebuia lepidophylla, Tabebuia shaferi*, and *Zamia pumila* (T. Armentano pers. comm. 2003). The macrogroup also includes pine-oak dry forests in western Cuba, where the oak species *Quercus oleoides* also occurs in the Dry Evergreen Oak forest type distributed in Mesoamerica and included in the macrogroup.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Pine rockland is maintained by regular fire (O'Brien et al. 2008), and susceptible to other natural disturbances such as hurricanes, frost events, and sea-level rise (Ross et al. 1994, as cited in FNAI 2010a). Fires historically burned on an interval of around 3 to 7 years (Snyder et al. 1990) and were typically started by lightning strikes during the frequent summer thunderstorms. Presently, prescribed fire must be periodically introduced into pine rocklands to sustain community structure, prevent invasion by woody species, maintain high herbaceous diversity (Loope and Dunevitz 1981, as cited in FNAI 2010a), and prevent succession to rockland hammock. The ecotone between pine rockland and rockland hammock in Florida is abrupt when regular fire is present in the system. In the absence of fire, the pine rockland may be replaced by hardwood species within several decades (Stout and Marion 1993). Fire is also reported as part of the natural dynamic of dry, pre-montane, mixed *Pinus caribaea - Quercus oleoides* forests of Belize and Honduras, another community represented within this macrogroup. See also Kennedy and Horn (2008).

Hurricanes and storms can have a major impact on pine rocklands. High winds can significantly affect plant structure or composition by causing canopy and subcanopy mortality (Platt et al. 2000, as cited in FNAI 2010a), resulting in subsequent stimulation of shrub or herbaceous growth. Pine rocklands near the coast may be temporarily inundated by saltwater during severe storms, which can kill or damage vegetation (Snyder et al. 1990). Rare frost events bringing below-freezing temperatures can reduce tropical hardwoods. Because tropical and subtropical plants in pine rocklands are more exposed to below-freezing temperatures in the relatively open understory, they are more likely to succumb to freeze damage than their counterparts in sheltered rockland hammocks (FNAI 2010a). The area of pine rockland in the Florida Keys has been reduced since the 1930s. This is at least partially due to increased ground and soil salinity resulting from a 15-cm local rise in sea level that has occurred since that time (Ross et al. 1994, as cited in FNAI 2010a).

The fire cycle is central to succession in these pine forest communities in the Caribbean, and palms, shrubs and hardwood trees are dynamic structural components. That is, they are relatively sensitive to fires not intense enough to cause the complete replacement of the stand, but recover quickly thereafter. This is surely true for shrubs and hardwoods, which resprout prolifically after fire, but palms grow very slowly and do not resprout. Besides intensity, season of fire is also an important component in the fire regime of pine forests in the Caribbean, as it may influence fuel consumption, fire intensity, and forest development during the post-burn period (Liu and Menges 2005 and references therein). In addition to its effects on existing vegetation, a very intense fire may hinder recovery of the plant community (Spier and Snyder 1998), thereby constraining the development of fuel loads in the post-burn period. Thus the effect of different fire cycles, natural or human-caused, has the capacity to result in different structure and composition of the pine forest ecosystems. In addition to fires, hurricanes are another major natural disturbance affecting the distribution, composition and structure of the pine forests.

ENVIRONMENT

Environmental Description: *Climate*: Mean annual temperatures in the area of distribution of the macrogroup range from 23°C (74°F) in the north to 26°C (77°F) in the Lower Keys. Mean annual temperature in the West Indies distribution of the macrogroup is around 25°C. Precipitation primarily occurs from May or June to October and ranges from 1650 mm along the Atlantic coast decreasing southward to less than 1000 mm in the Lower Keys (Gillespie 2006). Annual precipitation in the distributional range of this forest in Cuba is less than 1500 mm in the west part of the range and increases towards the east.

*Soil/Substrate*: Limestone is the dominant substrate in the macrogroup distribution in Florida and the Bahamas, with skeletal organic soils with minor mineral components, rarely exceeding 20 cm in depth (Snyder et al. 1990, as cited in Gillespie 2006). In Cuba, the pine forests included in this macrogroup are found primarily on acidic soils that have little water-retention capacity and are poor in essential elements. The principal soil types on which they occur are quartziferous sands, pseudo-spodosols in the west and lateritic soils in the east. Only pine trees, which have an ectomycorrhizal symbiosis with fungi, are capable of obtaining in this way a sufficient amount of nutrients to achieve the size of trees. In Florida and the Bahamas, pine rockland occurs on relatively flat, moderately to well-drained terrain, from 2-7 m above sea level (Snyder et al. 1990). The oolitic limestone is at or very near the surface, and there is very little soil development. Soils are generally composed of small accumulations of nutrient-poor sand, marl, clayey loam, and organic debris in depressions and crevices in the rock surface. Organic acids occasionally dissolve the surface limestone causing collapsed depressions in the surface rock called solution holes (Outcalt 1997b). Drainage varies according to the porosity of the limestone substrate, but is generally rapid. Consequently, most sites are wet for only short periods following heavy rains. During the rainy season, however, some sites may be shallowly inundated by slow-flowing surface water for up to 60 days each year (FNAI 2010a).

The macrogroup occurs in lowlands and low hills, littoral or sublittoral flatlands on limestone or on thin sandy soils over limestone, or on light gray quartz sand or soils derived from sandstone or serpentine bedrock in the case of communities in Cuba. All these different substrates are nutrient-poor and drain very rapidly. Consequently, most sites are wet for only short periods following heavy rains.

DISTRIBUTION

\*Geographic Range: Natural communities within this macrogroup are distributed in the southern Florida peninsula and the Florida Keys. In the Caribbean, pine forests are found in the Bahamas, Turks and Caicos Islands, Cuba, and Hispaniola. In Cuba, conifer forests occur in the eastern and western ends of the island.

Nations: BS, BZ, CR, CU, DO, GT, HN, HT, MX, NI, SV?, TC, US, XC, XD

States/Provinces: FL

USFS Ecoregions (2007) [optional]: 411A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G484 | East Cuban Pine Woodland |
| G482 | Caribbean Pine-Oak Woodland |
| G483 | Mesoamerican Pine-Oak Dry Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-08-28 | M006 Caribbean & Central American Pine - Oak Forest Macrogroup | M006 reworked as M296, M561, M562 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Pine Forest | Duever et al. 1986 |  |
| = | Pine Rockland | FNAI 2010a |  |
| = | Rockland Pine Forest | Davis 1943 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse and C.W. Nordman

Acknowledgments [optional]:

Version Date: 08 Jan 2015

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1. Forest & Woodland

1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland

M134. Caribbean Coastal Lowland Dry Forest

Type Concept Sentence: This vegetation is found in flat lowlands and low hills (ca. 300 m elevation) with a pronounced dry season along south Florida and the Antilles. Forests have low stature, high density of small and medium-sized trees, and have single-layer canopies with no emergent trees. The herb layer is poorly developed or completely lacking. Floristic diversity is low compared to more humid forests, and high species dominance is common. Variation in the dry season period, topography, and substrate determine the specific characteristics of the vegetation communities in this macrogroup since all of these have great importance in dry forests as determinants of variation in water availability.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland (D099)

Elcode: M134

\*Scientific Name: *Bursera simaruba - Coccoloba diversifolia - Eugenia* sp. Caribbean Coastal Lowland Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Gumbo Limbo - Tie-tongue - Stopper species Caribbean Coastal Lowland Dry Forest Macrogroup

\*Colloquial Name: Caribbean Coastal Lowland Dry Forest

\*Type Concept: This macrogroup encompass tropical and subtropical forests characterized by a dry season of several months that occur in coastal lowlands and low hills, littoral or sublittoral flatlands with rock outcrops and higher terraces facing the sea, on limestone coral shelves, humic carbonate soils, shallow red ferralitic soils, or sandy soils of stabilized, old coastal dunes in south Florida, the Florida Keys, the Greater Antilles, and other Caribbean islands such as those of the Bahamas and Virgin Islands archipelagos. The species composition and structure of these forests vary depending upon the substrate and climate across their distribution. They are broadleaf semi-deciduous to evergreen forests with a canopy between 6-10 m of height. The density of stems tends to be very high. The woody understory is mostly evergreen. The herb layer is poorly developed or completely lacking. In the continental U.S., the Caribbean dry forest occurs in two settings: the hardwood hammock forest in southern Florida, on elevated outcrops of limestone, and the strand forest - a narrow band of hardwood forest and tall shrublands lying just inland of the coastal dune system in south Florida. The latter occur on stabilized, old coastal dunes, often with substantial shell components. In both cases the vegetation is characterized by hardwood species with tropical affinities, with *Eugenia axillaris* as the most commonly shared species. The Florida hammock forest occurs in three discrete regions, including the Florida Keys, southeastern Big Cypress, and the Miami Rock Ridge. Tropical hardwood species likely to be encountered include *Ardisia escallonoides, Bursera simaruba, Coccoloba diversifolia, Eugenia axillaris*, and *Guapira discolor*. The northward ranges of these species are limited by the incidence of frost. These forests tend to have a dense canopy that produces deeper shade, less evaporation, and lower air temperature than surrounding vegetation in these locations. This microclimate, in combination with high water tables, tends to keep humidity levels high. A number of orchid and bromeliad species thrive in such conditions. Unlike much U.S. coastal plain vegetation, fire is a major threat to these hardwood hammock forests.

Dry forests of the Caribbean islands share some features with the Florida dry forests, such as the high density of stems, low stature and relative low floristic diversity, with several shared species among the dominant ones (*Bursera simaruba, Coccoloba diversifolia, Eugenia foetida, Gymnanthes lucida*). Diagnostic species of this type include *Amyris elemifera, Bursera simaruba, Bucida buceras, Coccoloba diversifolia, Coccoloba uvifera, Coccoloba krugii, Eugenia axillaris, Eugenia foetida, Erithalis fruticosa, Exostema caribaeum, Haematoxylum campechianum, Gymnanthes lucida, Guettarda krugii, Guaiacum officinale, Guaiacum sanctum, Jacquinia armillaris, Krugiodendron ferreum, Nectandra coriacea, Pisonia albida, Sabal palmetto, Simarouba glauca, Savia sessiliflora*, and *Thouinia striata var. portoricensis*. These forests also share the limestone substrate which is widespread among the coastal Antilles. Caribbean coastal dry forests in Cuba are slightly taller and have two canopy layers; with the upper layer reaching 12-15 m. This macrogroup also includes lowland semi-deciduous forests on richer substrates in Cuba, Hispaniola, and several smaller Caribbean islands. However, centuries of human occupation and agricultural land use have largely replaced these natural forests described in the literature as more diverse, semi-deciduous, and with the canopy up to 15-20 m height.

\*Diagnostic Characteristics: Diagnostic characteristics for this forest macrogroup are low stature with few or no emergent trees, poorly distinguished canopy layers, a high density of stems resulting from the majority of tree species having a tendency to develop several main stems (to coppice), and a dry season severe enough to select for drought-deciduous or evergreen, drought-tolerant trees. Among the species likely to be encountered throughout are *Bursera simaruba, Coccoloba diversifolia*, and *Eugenia axillaris*. The tree species of the tropical hammocks of Florida are a subset of the native Caribbean dry forests species that can withstand extremely rare frost events (Gillespie 2006).

\*Classification Comments: The distinction between this macrogroup and ~Caribbean Dry Limestone Forest Macrogroup (M294)$$ should be clarified, since the latter refers to plant communities that grow on limestone substrates in dry climates, but also in other dry geophysical settings within humid climates. Calcium carbonate-rich soils create physiological and nutrient stress on the plant communities growing on them which results in distinct structure and composition.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The dry forests of south Florida and the Caribbean have a greater density of individual stems and shorter canopy heights than tropical dry forests in the mainland Neotropics (Gillespie 2006, Lugo et al. 2006). Density varies from 14,000 stems >2.5 cm/ha in Puerto Rico dry forest to 4600 stems/ha in Florida. Canopy height ranges between 5 and 10 m, with a higher mean height in Florida hammock forest stands than in Puerto Rico dry forest, and few trees reaching 18-20 m height. The canopy is seasonally open; however, there are few truly deciduous species in these forests, with early-successional forests dominated by broadleaf semi-deciduous species and late-successional forests dominated by broadleaf evergreen species. Drought-deciduousness is the principal adaptive mode of tropical dry deciduous forests, and at the dry extremes, small evergreen trees are important (Lugo et al. 2006). There is a notable lack of lianas compared with dry forests in the mainland Neotropics (Gillespie 2006). Despite relatively low species diversity, lifeform diversity is common and is accompanied by diversity in plant habit, leaf size and structure, drought tolerance and growth seasonality; this diversity is attributed to habitat heterogeneity coupled with strong rainfall seasonality (Lugo et al. 1978, Medina 1995, as cited in Lugo et al. 2006). In south Florida, dry tropical forests occurring in sites with higher mean temperature and lower precipitation have greater stand density, while higher precipitation and lower temperatures result in greater canopy heights (Gillespie 2006). Epiphytic orchid and bromeliad species are often found in areas where frosts or anthropogenic disturbances have not occurred in a long time.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The vegetation is characterized by hardwood species with tropical affinities. Common species in south Florida, the Bahamas, Cuba and Puerto Rico are *Amyris elemifera, Bursera simaruba, Coccoloba diversifolia, Coccoloba uvifera, Eugenia axillaris, Eugenia foetida, Gymnanthes lucida, Krugiodendron ferreum, Nectandra coriacea, Sabal palmetto*, and *Simarouba glauca*. Dominant species in Puerto Rico coastal dry forest are *Coccoloba krugii, Erithalis fruticosa, Exostema caribaeum, Guettarda krugii, Gymnanthes lucida, Pisonia albida, Savia sessiliflora*, and *Thouinia striata var. portoricensis*. Given the harsh conditions of the Antillean dry forests, those relatively few species that thrive under the stress are able to dominate sites (Lugo et al. 2006). Endemism is very high and represents about 50% of the species. The northern extent of this macrogroup is limited by periodic freezes and cold-tolerance of tropical constituent species, such as *Ardisia escallonoides, Eugenia axillaris, Exothea paniculata, Guapira discolor, Metopium toxiferum, Nectandra coriacea*, and *Piscidia piscipula* (Johnson and Muller 1993a).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Along the Florida distribution of this macrogroup, the coastal maritime hammocks are prone to disturbance from hurricanes, which can include extremely high winds, and in coastal areas salt spray, and saltwater storm surge. The rockland habitats on the Florida mainland are mostly inland and not subject to the salt spray and storm surge associated with hurricanes. However, winter freezes sometimes occur and result in damage of the tropical woody plants. In the Florida Keys, freezing temperatures are very unusual.

Drought-deciduousness is the principal adaptive mode of tropical dry deciduous forests, and at the dry extremes, small evergreen trees are important (Lugo et al. 2006). There is a notable lack of lianas compared with dry forests in the mainland Neotropics (Gillespie 2006). Despite relatively low species diversity, lifeform diversity is common and is accompanied by diversity in plant habit, leaf size and structure, drought tolerance and growth seasonality; this diversity is attributed to habitat heterogeneity coupled with strong rainfall seasonality (Lugo et al. 1978, Medina 1995, as cited in Lugo et al. 2006). Caribbean dry forests have to cope with highly stressful conditions given the combination of environmental features such as low moisture availability, long dry seasons, decadal cycles of pronounced drought, wind exposure and salt spray in littoral locations. These forests are also periodically exposed to hurricane conditions with effects that span from flooding with seawater to defoliation, treefall and other structural changes due to strong winds.

Overall, Caribbean coastal dry forests are exposed to harsh environmental conditions that, depending on their intensity, can cause damage or diebacks, such as seasonal water deficit, nutrient stress, strong winds and salt spray, and saltwater storm surge. This has influenced the development of structural and physiological mechanisms to cope, making them very resilient to disturbance. Among the more outstanding ones are a high resistance to wind (short stature), a high proportion of root biomass, high soil carbon and nutrient accumulation below ground, the ability of most tree species to resprout, and high nutrient use efficiency (Lugo et al. 2006).

Fire is not part of the natural dynamics of Caribbean coastal dry forests (though many dry forests are now subject to anthropogenic fires). This is why many examples occur alongside natural firebreaks, such as the leeward side of exposed limestone (Robertson 1955), moats created by limestone solution (Duever et al. 1986), and elevated outcrops above marshes, scrub cypress, or sometimes mangrove swamps (Snyder et al. 1990), or isolated on ridges in pine woodlands.

ENVIRONMENT

Environmental Description: *Climate*: Caribbean dry forests occurring on the mainland in Florida and the Upper Keys are periodically exposed to short-term frost and their flora is composed of a subset of native tropical trees that can withstand rare frost events. Mean annual temperatures in the Caribbean dry forest region range from 23°C (74°F) in the north to 26°C (77°F) in the Lower Keys. Precipitation primarily occurs from June to October and ranges from 1650 mm along the Atlantic coast decreasing southward to less than 1000 mm in the Lower Keys (Gillespie 2006). Precipitation in the distribution range of this forest in Puerto Rico and over most of the islands of Culebra and Vieques ranges from 600 to 1100 mm per year (Brandeis et al. 2009), with two dry seasons. U.S. Virgin Islands examples may be even drier. Some of the U.S. Virgin Islands examples reach 1200 mm per year.

*Soil/Substrate*: Limestone is the dominant substrate in Caribbean dry forests of Florida and the Bahamas, with skeletal organic soils with minor mineral components, rarely exceeding 20 cm in depth (Snyder et al. 1990, as cited in Gillespie 2006). In Florida, the coastal maritime hammocks are found on stabilized coastal dunes, often with substantial shell components. In the Greater Antilles the distribution of dry forests is indicative of limestone substrates occurring in narrow strips on the northern and southern coastal areas. Isolated inland, ultramafic soils associated with limestone also support dry forests. In flat low-lying limestone archipelagos, such as the Bahamas, the Cayman Islands, Mona and Anegada, dry forests and shrublands dominate. In volcanic, low mountainous islands of the Lesser Antilles, dry forests dominate except for protected sites and ravines where moist forest can grow (Lugo et al. 2006).

Caribbean dry forests have to cope with highly stressful conditions given the combination of environmental features such as low moisture availability, long dry seasons, decadal cycles of pronounced drought, wind exposure and salt spray in littoral locations. These forests are also periodically exposed to hurricane conditions with effects that span from flooding with seawater to defoliation, treefall and other structural changes due to strong winds.

DISTRIBUTION

\*Geographic Range: This macrogroup is found in south Florida, the Florida Keys, the Bahamas, Cayman Islands, Cuba, Hispaniola, Jamaica, Leeward Islands, Puerto Rico, Trinidad and Tobago, and Windward Islands.

Nations: BS, CU, DO, HT, JM, MQ, PR, TC, TT, US, VE, VG?, VI, XD

States/Provinces: FL

USFS Ecoregions (2007) [optional]: 232D:CC, 232G:CC, 411A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G476 | Caribbean Coastal Dry Evergreen Forest |
| G765 | Caribbean Hardwood Hammock & Coastal Strand Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Rockland Forest | Ross et al. 1992 |  |
| = | Tropical Hammock | Snyder et al. 1990 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse, C.W. Nordman, and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 30 Oct 2015

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1. Forest & Woodland

1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland

M294. Caribbean Dry Limestone Forest

Type Concept Sentence: These are relatively species-poor dry forests but with high plant endemism. They occur in seasonal climates with 800-1500 mm rainfall per year and the dry season can last two to several months. The canopy is somewhat open, mostly deciduous and 6-15 m height, with emergent trees only in locations with higher precipitation. A lower layer may or may not be present and typically is mostly evergreen, ground vegetation is sparse. Lower annual precipitation on a limestone substrate and shallow soils results in a dense shrub layer about 2-4 m high.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland (D099)

Elcode: M294

\*Scientific Name: Caribbean Dry Limestone Forest Macrogroup

\*Common (Translated Scientific) Name: Caribbean Dry Limestone Forest Macrogroup

\*Colloquial Name: Caribbean Dry Limestone Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range: This macrogroup is found in Cuba, Jamaica, and Puerto Rico, and likely in other Caribbean islands.

Nations: CU, DO, JM, PR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low - Poorly Documented

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G478 | East Caribbean Karstic Forest |
| G477 | West Caribbean Karstic Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-04-24 | M293 Caribbean Dry Broadleaf Forest Macrogroup | M293 merged into M294 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland

M561. Caribbean-Mesoamerican Seasonal Dry Forest

Type Concept Sentence: Este macrogrupo incluye desde bosque seco caducifolio estacional hasta los bosques semi-deciduos distribuidos desde el nivel del mar hasta los 1.400 m de altitud en la cuenca del Caribe desde México hasta Panamá.

This macrogroup includes seasonally dry deciduous to semi-deciduous forests distributed from sea level up to 1400 m elevation in the Caribbean basin from Mexico to Panama.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland (D099)

Elcode: M561

\*Scientific Name: Caribbean-Mesoamerican Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Caribbean-Mesoamerican Seasonal Dry Forest Macrogroup

\*Colloquial Name: Caribbean-Mesoamerican Seasonal Dry Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range: This macrogroup occurs in the Caribbean basin from Mexico to Panama.

Nations: BZ, CR, GT, HN, MX, NI, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-08-28 | M006 Caribbean & Central American Pine - Oak Forest Macrogroup | M006 reworked as M296, M561, M562 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date: 08 Jan 2015

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\*References [Required if used in text]:

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1. Forest & Woodland

1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland

M562. Pacific Mesoamerican Seasonal Dry Forest

Type Concept Sentence: Este macrogrupo incluye bosque seco caducifolio estacional y los bosques semi-deciduos distribuidos desde el nivel del mar hasta los 1.400 m de altitud en la cuenca del Pacífico desde México hasta Panamá.

This macrogroup includes seasonally dry deciduous to semi-deciduous forests distributed from sea level up to 1400 m elevation in the Pacific basin from Mexico to Panama.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ea. Caribbean-Mesoamerican Dry Forest & Woodland (D099)

Elcode: M562

\*Scientific Name: Pacific Mesoamerican Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Pacific Mesoamerican Seasonal Dry Forest Macrogroup

\*Colloquial Name: Pacific Mesoamerican Seasonal Dry Forest

\*Type Concept: Este macrogrupo incluye bosque seco caducifolio estacional y bosques semi-deciduos distribuidos desde el nivel del mar hasta los 1.400 m de altitud en la cuenca del Pacífico desde México hasta Panamá. Precipitacion generalmente oscila entre 1.000 y 1.600 mm / año y temperaturas medias anuales son de más de 24 grados C. Los bosques de este macrogrupo experimentan al menos una estación seca de 4-6 meses / año. Estos bosques ocurren en suelos de profundidad variable, textura, y la alcalinidad, y típicamente tienen un dosel de 10-25 m de altura, cerrado en función del contenido y tipo de nutrientes de los suelos. Una moderada a alta diversidad de especies de árboles caducifolios tropicales dominan el dosel de los árboles de varios niveles. La estructura y composición varían a lo largo del amplio rango de distribución del macrogrupo, que incluye las topografías montañosas que influyen en la disponibilidad de humedad y características del suelo. Géneros característicos con varias especies o especies diagnósticas incluyen *Astronium, Bursera, Ceiba, Cassia, Calycophyllum, Cochlospermum, Cordia, Enterolobium, Ficus, Gyrocarpus, Lysiloma, Plumeria, Platymiscium, Pterocarpus, Thouinidium, Zanthoxylum*, y otros.

This macrogroup includes seasonally dry deciduous to semi-deciduous forests distributed from sea level up to 1400 m elevation in the Pacific basin from Mexico to Panama. Precipitation generally varies from 1000 to 1600 mm/year and annual mean temperatures are over 24°C. Forests in this macrogroup experience at least one distinct dry season of 4-6 months/year. These forests occur on soils of variable depth, texture, and alkalinity, and typically have a closed canopy 10-25 m high depending on the type and nutrient contents of the soil. A moderate to high diversity of tropical deciduous tree species dominate the multi-tiered tree canopy. The structure and composition vary along the large distributional range of the macrogroup, which includes mountainous topographies that influence moisture availability and soil characteristics. Characteristic genera with several species or diagnostic species include *Astronium, Bursera, Ceiba, Cassia, Calycophyllum, Cochlospermum, Cordia, Enterolobium, Ficus, Gyrocarpus, Lysiloma, Plumeria, Platymiscium, Pterocarpus, Thouinidium, Zanthoxylum*, among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range: This macrogroup is distributed from sea level up to 1400 m elevation in the Pacific basin from Mexico to Panama.

Nations: CR, GT, HN, MX, NI, PA, SV

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-08-28 | M006 Caribbean & Central American Pine - Oak Forest Macrogroup | M006 reworked as M296, M561, M562 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

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1. Forest & Woodland

1.A.1.Ei. Colombian-Venezuelan Dry Forest

D219. Colombian-Venezuelan Dry Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.1.Ei. Tropical Dry Forest & Woodland (F003)

Elcode: D219

\*Scientific Name: Colombian-Venezuelan Dry Forest Division

\*Common (Translated Scientific) Name: Colombian-Venezuelan Dry Forest Division

\*Colloquial Name: Colombian-Venezuelan Dry Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M563 | Guajiran Seasonal Dry Forest |
| M565 | Llanos Seasonal Dry Forest |
| M566 | Tumbes Guayaquil Seasonal Dry Forest |
| M573 | Northern Andean Seasonal Dry Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ei. Colombian-Venezuelan Dry Forest

M563. Guajiran Seasonal Dry Forest

Type Concept Sentence: Seasonally dry deciduous to semi-deciduous forests distributed along the Caribbean coast of Colombia and Venezuela and inland at Lake Maracaibo in Venezuela and also in the foothills of the Sierra Nevada de Santa Marta and the Perija range in Colombia. Usually occur on alluvial-colluvial lowlands between sea level and 500 m elevation. They can attain a relatively complex, multi-layered structure with a dense canopy. In the dry end of their range these forests have a more open canopy and fewer strata. In general those growing at higher elevations have more moisture available from precipitation and fog.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ei. Colombian-Venezuelan Dry Forest (D219)

Elcode: M563

\*Scientific Name: Guajiran Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Guajiran Seasonal Dry Forest Macrogroup

\*Colloquial Name: Guajiran Seasonal Dry Forest

\*Type Concept: This macrogroup includes seasonally dry deciduous to semi-deciduous forests distributed along the Caribbean coast of Colombia and Venezuela and inland, surrounding Lake Maracaibo in Venezuela and also on the foothills of Sierra Nevada de Santa Marta and the Perija range in Colombia, usually growing on alluvial-colluvial lowlands between sea level and 500 m elevation, depending on the location. They can attain a relatively complex, multi-layered structure with a dense canopy or, in the dry end of their gradient, have a more open canopy and less strata. In general those growing in the upper elevations have more moisture available (from precipitation and fog). Characteristic species from sub-humid to dry forests are *Cordia panamensis, Swartzia pinnata, Ocotea glandulosa, Hura crepitans, Cedrela odorata, Carapa guianensis, Roystonea olerace, Anacardium excelsum, Calycophyllum candidissimum, Brosimum alicastrum, Trophis racemosa, Simira klugii, Belencita nitida, Centrolobium paraense, Maytenus karstenii, Melicoccus bijugatus, Gustavia tejerae, Eugenia oblongifolia, Myroxylon balsamum, Triplaris lindeniana, Machaerium* spp., *Tabebuia chrysantha, Tabebuia serratifolia, Tabebuia heterophylla (= Tabebuia pentaphylla), Trichilia pleeana, Allophylus racemosus (= Allophylus occidentalis), Trophis racemosa, Eugenia mcvaughii, Acacia glomerosa, Lochocarpus punctatus, Coccoloba fallax, Guazuma ulmifolia, Enterolobium cf. cyclocarpum, Morisonia americana, Bursera graveolens, Ficus prinoides, Sabal mauritiiformis, Bactris minor, Bourreria cumanensis, Erythroxylum cumanense, Brownea penduliflora, Bauhinia multinervia (= Bauhinia megalandra), Senna bicapsularis (= Cassia emarginata), Calliandra caracasana, Inga punctata, Erythrina poeppigiana, Platymiscium diadelphum, Guaiacum officinale, Cochlospermum vitifolium, Jacquemontia cumanensis, Stenocereus griseus*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range: Caribbean coast of Colombia, Venezuela and Trinidad and Tobago.

Nations: CO, TT, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M564 Cauca Magdalena Seasonal Dry Forest Macrogroup | M564 concept covered by M563 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ei. Colombian-Venezuelan Dry Forest

M565. Llanos Seasonal Dry Forest

Type Concept Sentence: Seasonally dry deciduous forests occurring across the Llanos in Colombia and Venezuela, and at the eastern limit of the Llanos where it borders Orinoquian moist forests. These forests are between 6 and 14 m in stature, not very dense (about 50-60% canopy coverage), and dominated by deciduous species. They form a mosaic with the savannas. In many cases what is now left is a small patch of forest, although originally they covered large areas. These forests grow on topographically higher ground than the surrounding savannas, such as in high plains or mesas, and on low hills with moderately drained, high nutrient content soils.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ei. Colombian-Venezuelan Dry Forest (D219)

Elcode: M565

\*Scientific Name: Llanos Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Llanos Seasonal Dry Forest Macrogroup

\*Colloquial Name: Llanos Seasonal Dry Forest

\*Type Concept: This macrogroup includes seasonally dry, deciduous forests occurring across the Llanos in Colombia and Venezuela, and those of the eastern limit of the Llanos with the Orinoquian moist forests. Overall, they are forests between 6 and 14 m tall, not very dense (about 50-60% coverage) and with dominance of deciduous species. They form a mosaic with the savannas; in many cases what is now left is a small patch, although originally they covered large areas. This forest grows on topographically higher ground than the surrounding savannas, such as in high plains or mesas, and low hills on moderately drained soils and with high nutrient content. Diagnostic species are *Acrocomia sclerocarpa, Annona jahnii, Apeiba tibourbou, Bursera simaruba, Cassia moschata, Enterolobium cyclocarpum, Godmania aesculifolia, Melicoccus bijugatus, Platymiscium pinnatum, Ruprechtia hamanii, Spondias mombin, Xilopia aromatica, Randia aculeata, Cereus* sp., *Bourreria cumanensis, Gyrocarpus americanus, Maclura tinctoria (= Chlorophora tinctoria), Hymenaea courbaril, Bocageopsis multiflora, Parkia pendula, Qualea rosea, Licania subrachnophylla, Sclerolobium bracteosum, Tabebuia serratifolia, Tabebuia billbergii, Capparis odoratissima, Pithecellobium tortum, Guapira pacurero, Erythroxylum havanense*, and *Pithecellobium oblongum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M344 Orinoquian Savanna Macrogroup | M344 reconfigured into M676 & part of M565 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ei. Colombian-Venezuelan Dry Forest

M566. Tumbes Guayaquil Seasonal Dry Forest

Type Concept Sentence: Dry deciduous to semi-deciduous forests growing in areas with a dry season of more than four months on the coastal plain of Ecuador. Occurs up to about 500 m elevation in the hills of the coastal range and to about 900 m elevation in the foothills of the Andes in the south. In Peru these forests are distributed at higher elevation in the Amotape hills and further south along the western foothills of the Andes to northern Lambayeque. The uneven canopies of these forests are typically 15-20 m tall, with a large proportion of deciduous species and feature a dense and semi-deciduous shrub layer.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ei. Colombian-Venezuelan Dry Forest (D219)

Elcode: M566

\*Scientific Name: Tumbes Guayaquil Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Tumbes Guayaquil Seasonal Dry Forest Macrogroup

\*Colloquial Name: Tumbes Guayaquil Seasonal Dry Forest

\*Type Concept: The macrogroup represents the dry deciduous to semi-deciduous forests growing on the coastal plain of Ecuador with a dry season of more than 4 months. They reach up to about 500 m altitude in the hills of the coastal range located in this region and to about 900 m in the foothills of the Andes Mountains to the south, close to the border with Peru. In Peru it is distributed higher up, to 1500-2000 m elevation in the Amotape hills and further south in the western foothills of the Andes up to northern Lambayeque. In general these forest are 15 20 m tall, have an uneven canopy with a large proportion of deciduous species, and a dense and semi-deciduous shrub layer. Diagnostic species are *Ceiba trischistandra, Cavanillesia platanifolia, Cochlospermum vitifolium, Eriotheca ruizii, Erythrina velutina, Erythrina smithiana, Tabebuia chrysantha, Ziziphus thyrsiflora, Trichilia hirta, Senna mollissima, Guazuma ulmifolia, Phyllanthus anisobolus, Rauvolfia tetraphylla, Carica parviflora, Triplaris cumingiana, Pithecellobium excelsum, Cordia lutea, Coccoloba ruiziana, Capparis heterophylla, Capparis* spp., *Achatocarpus nigricans, Simira ecuadoriensis, Geoffroea spinosa, Machaerium millei, Piscidia carthagenensis, Caesalpinia glabrata, Bauhinia aculeata, Terminalia oblonga, Terminalia valverdae, Gallesia integrifolia, Loxopterygium huasango, Bursera graveolens, Centrolobium ochroxylum, Miroxylon balsamum, Hura cf. crepitans, Ficus jacobii, Delostoma integrifolium*. On higher grounds, with additional seasonal moisture from fog enshrouding these forests, typical species are *Centrolobium ochroxylum, Brosimum alicastrum, Alseis eggersii, Lonchocarpus* sp., *Ficus trigonata, Clarisia racemosa, Ficus* spp., *Pochota trinitensis (= Bombacopsis trinitensis), Pseudobombax millei, Clavija eggersii, Erythroxylum patens, Trichilia elegans, Gustavia pubescens, Ampelocera* sp., *Acnistus arborescens, Zanthoxylum fagara, Myrcia splendens*, among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ei. Colombian-Venezuelan Dry Forest

M573. Northern Andean Seasonal Dry Forest

Type Concept Sentence: Subhumid forests of the northern Andes. This forest type occurs on some of the lower slopes of the Andes in Venezuela, Colombia and Ecuador, generally at the foothills of intermontane valleys or in transitions to seasonally dry areas. Composition varies depending on the floristic region occurring at lower elevations. Nevertheless, these forests share the characteristic physiognomy of seasonally dry tropical forest, with an uneven canopy, less dense understory, fewer epiphytes and shorter stature than more moist forests. The floristic composition includes members of the Fabaceae, Bombacacae, Meliaceae, Bignoniaceae, and Burseraceae as dominant in the canopy layer, and Euphorbiaceae, Asteraceae and Cactaceae in the understory.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ei. Colombian-Venezuelan Dry Forest (D219)

Elcode: M573

\*Scientific Name: Northern Andean Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Northern Andean Seasonal Dry Forest Macrogroup

\*Colloquial Name: Northern Andean Seasonal Dry Forest

\*Type Concept: This macrogroup represents sub-humid forests of the northern Andes. This type of forest occurs in some of the lower slopes of the Andes in Venezuela, Colombia and Ecuador, generally at the foothills of intermontane valleys or in the transition to seasonally dry areas. The specific composition may vary depending on the floristic region of contact further down in the lowlands, but they share the characteristic physiognomy of seasonally dry tropical forest, with an uneven canopy, less dense understory, fewer epiphytes and shorter stature. The floristic composition includes members of the Fabaceae, Bombacacae, Meliaceae, Bignoniaceae, and Burseraceae as dominant in the canopy layer, and Euphorbiaceae, Asteraceae and Cactaceae in the understory.

\*Diagnostic Characteristics:

\*Classification Comments: A recent paper by DRYFLOR (2016) indicates that the northern inter-Andean dry forests have more floristic similarity with northern coastal dry forests in Colombia and Venezuela than with montane Andean forests to the south. In addition, the northern Andes are placed in the same biogeographic area (NeoGranadian Region) as western Colombia and northern Venezuela by Rivas-Martinez et al. (2011).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

DRYFLOR. 2016. Plant diversity patterns in neotropical dry forests and their conservation implications. Science 353:1383-1387 (with supplementary material).

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Rivas-Martínez, S., G. Navarro, A. Penas, and M. Costa. 2011. Biogeographic map of South America. A preliminary survey. International Journal of Geobotanical Research 1:21-40.

1. Forest & Woodland

1.A.1.Ej. Guianan Dry Forest

D220. Guianan Dry Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.1.Ej. Tropical Dry Forest & Woodland (F003)

Elcode: D220

\*Scientific Name: Guianan Dry Forest Division

\*Common (Translated Scientific) Name: Guianan Dry Forest Division

\*Colloquial Name: Guianan Dry Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR?, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M567 | Central Guianan Seasonal Dry Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ej. Guianan Dry Forest

M567. Central Guianan Seasonal Dry Forest

Type Concept Sentence: Seasonal semi-deciduous forests of the northwestern and northern piedmont of the Guiana Shield in Venezuela, located between the Orinoco Llanos and semi-evergreen and evergreen forests of the Guiana Shield. Canopy height is 15-20 m. Diagnostic species are *Cochlospermum orinocense, Elaeoluma glabrescens, Erisma uncinatum, Eschweilera subglandulosa, Galipea davisii, Licania canescens, Licania cruegeriana, Licania densiflora, Macrolobium bifolium, Parinari excelsa, Terminalia amazonia*, and *Vochysia glaberrima*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ej. Guianan Dry Forest (D220)

Elcode: M567

\*Scientific Name: Central Guianan Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Central Guianan Seasonal Dry Forest Macrogroup

\*Colloquial Name: Central Guianan Seasonal Dry Forest

\*Type Concept: Seasonal semi-deciduous forests of the northwestern and northern piedmont of the Guiana Shield in Venezuela, located between the Orinoco Llanos and semi-evergreen and evergreen forests of the Guiana Shield. These forests are 15-20 m tall. Diagnostic species are *Parinari excelsa, Licania canescens, Licania cruegeriana, Licania densiflora, Vochysia glaberrima, Elaeoluma glabrescens, Cochlospermum orinocense, Terminalia amazonia, Galipea davisii, Macrolobium bifolium, Eschweilera subglandulosa, Erisma uncinatum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR?, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ek. Brazilian-Parana Dry Forest

D221. Brazilian-Parana Dry Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.1.Ek. Tropical Dry Forest & Woodland (F003)

Elcode: D221

\*Scientific Name: Brazilian-Parana Dry Forest Division

\*Common (Translated Scientific) Name: Brazilian-Parana Dry Forest Division

\*Colloquial Name: Brazilian-Parana Dry Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M572 | Caatinga Seasonal Dry Forest |
| M872 | Cerradâo Sclerophyllous Woodland |
| M570 | Cerrado Seasonal Dry Forest |
| M568 | Brazilian Atlantic Seasonal Dry Forest |
| M571 | Parana Seasonal Dry Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ek. Brazilian-Parana Dry Forest

M572. Caatinga Seasonal Dry Forest

Type Concept Sentence: Seasonal deciduous forests that grow in the Caatinga (Brazil), in places with more moisture, nutrient availability, or richer soils than other Caatinga habitats. Occurs on residual reliefs occupying slightly peripheral positions along the western and southwestern boundaries of the Caatinga (i.e., karstic or limestone substrates in Bahia and northern Minas Gerais). Canopy height is 15-20 m, with lianas and some epiphytes. Besides typical Caatinga tree species such as *Myracrodrun urundeuva, Schinopsis brasiliensis*, and *Tabebuia impetiginosa*, diagnostic species are *Bauhinia trichosepala, Caesalpinia bracteosa, Pseudopiptadenia brenanii, Pseudopiptadenia contorta, Piptadenia viridifolia*, and *Plathymenia reticulata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ek. Brazilian-Parana Dry Forest (D221)

Elcode: M572

\*Scientific Name: Caatinga Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Caatinga Seasonal Dry Forest Macrogroup

\*Colloquial Name: Caatinga Seasonal Dry Forest

\*Type Concept: The macrogroup represents the seasonally dry deciduous forests that grow in the Brazilian phytogeographic region known as Caatinga, in places with improved moisture or nutrient availability due to topographic location (i.e., slopes of small ridges receiving more precipitation or humidity), or location in areas with richer soils on residual reliefs occupying slightly peripheral positions along the western and southwestern boundaries of the Caatinga (i.e., karstic or limestone substrates in Bahia sites and north of Minas Gerais). They are forest 15-20 m high, with lianas vines and some epiphytes. Besides some typical Caatinga tree species, such as *Schinopsis brasiliensis, Tabeabuia impetiginosa, Myracrodrun urundeuva, Pterogyne nitens*, diagnostic species of this group are *Bauhinia trichosepala, Caesalpinia bracteosa, Pseudopiptadenia brenanii, Pseudopiptadenia contorta, Piptadenia viridifolia, Acacia monacantha, Plathymenia reticulata, Hymenaea martiana*, and genera *Blanchetiodendron, Goniorrhachis*, and *Mysanthus*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ek. Brazilian-Parana Dry Forest

M872. Cerradâo Sclerophyllous Woodland

Type Concept Sentence: Sclerophyllous woodland of the Cerrado biogeographic region, distributed in Brazil, Bolivia and Paraguay. A transitional type between seasonal dry forests and the Cerrado savannas, with a woody cover >50% and trees 7-15 m high and a rich and varied shrub and grassland component. Characteristic species vary according to the location, soils, and climatic conditions, but are generally seasonal and show xeromorphic features. Soils vary from mesotrophic with high calcium content to lateritic and acidic or very shallow. Species composition is diverse with many endemics.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ek. Brazilian-Parana Dry Forest (D221)

Elcode: M872

\*Scientific Name: Cerradâo Sclerophyllous Woodland Macrogroup

\*Common (Translated Scientific) Name: Cerradâo Sclerophyllous Woodland Macrogroup

\*Colloquial Name: Cerradâo Sclerophyllous Woodland

\*Type Concept: Sclerophyllous woodland of the Cerrado biogeographic region, distributed in Brazil, Bolivia and Paraguay. It is a transitional type between the seasonal dry forest and the Cerrado savannas, with woody cover >50% and trees 7-15 m high, with a rich and varied shrub and grassland component. Characteristic species vary according to the location, soils and climatic conditions. In general they are seasonal and show xeromorphic features. The soils where they develop vary widely, from mesotrophic with high calcium content to lateritic and acidic, or very shallow. Characteristic species are *Hirtella glandulosa, Emmotum nitens, Sclerolobium paniculatum, Vochysia haenkeana, Virola sebifera, Blaepharocalyx salicifolius, Siphoneugena densiflora, Ocotea spixiana, Phoebe erythropoda, Callisthene major, Sclerolobium paniculatum, Siparuna guianensis*, and *Cardiopetalum calophyllum*, and for Bolivia cerradoes: *Magonia pubescens, Qualea grandiflora, Qualea multiflora, Qualea parviflora, Agonandra brasiliensis, Salvertia convallariodora, Caryocar brasiliense, Eriotheca gracilipes, Hancornia speciosa, Ouratea hexasperma, Callisthene fasciculata, Callisthene hassleri, Callisthene microphylla, Copaifera langsdorfii, Antonia ovata, Bonyunia antoniifolia, Cariniana multiflora, Pterodon emarginatus, Kielmeyera coriacea, Dipteryx alata, Plathymenia reticulata, Terminalia argentea, Bowdichia virgilioides, Xylopia aromatica, Allagoptera leucocalyx, Anacardium humile, Pseudobombax longiflorum, Himatanthus obovatus, Machaerium acutifolium, Guettarda viburnoides, Zamia boliviana, Lafoensia pacari, Priogymnanthus hasslerianus, Ananas ananassoides, Bromelia villosa*, among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-09-10 | M569 Chiquitano Seasonal Dry Forest Macrogroup | M569 split between M570 and M872 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ek. Brazilian-Parana Dry Forest

M570. Cerrado Seasonal Dry Forest

Type Concept Sentence: Seasonal deciduous forest distributed across the Cerrado in Brazil, on soils derived from limestone and basalt and with improved moisture and nutrient availability which allow the growth of forests instead of treed savannas. Includes seasonal forests with the same floristic affinity but with more extensive, continuous distribution in the Bolivian Chiquitano region adjacent to the southwest of the Cerrado. Forests range from partially open, mid-sized forests to 20-25 m high multi-strata forests with abundant lianas. Diagnostic species include *Acosmium cardenasii, Amburana cearensis, Anadenanthera colubrina, Anadenanthera peregrina, Cariniana estrellensis, Holocalyx balansae, Machaerium scleroxylon*, and *Pterogyne nitens*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ek. Brazilian-Parana Dry Forest (D221)

Elcode: M570

\*Scientific Name: Cerrado Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Cerrado Seasonal Dry Forest Macrogroup

\*Colloquial Name: Cerrado Seasonal Dry Forest

\*Type Concept: This macrogroup represents the seasonal deciduous forest distributed across the Cerrado in Brazil, on topographies or soils (limestone- and basalt-derived) with improved moisture and nutrient availability which allow the growth of forests instead of woody savannas. It includes also seasonal forests with the same floristic affinity but with more extensive, continuous distribution in the Bolivian lowlands adjacent to the southwest of the Cerrado, known as the Chiquitano region. Forests in this macrogroup range from partially open mid-sized forests to multi-strata forest, 20-25 m high, with abundant lianas. Diagnostic species include *Amburana cearensis, Anadenanthera colubrina, Cariniana estrellensis, Cassia ferruginea, Cedrela fissilis, Centrolobium tomentosum, Chloroleucon tenuiflorum, Dilodendron bipinnatum, Guazuma ulmifolia, Jacaranda caroba, Lonchocarpus domingensis (= Lonchocarpus sericeus), Physocalymma scaberrimum, Platycyamus regnellii, Trichilia elegans, Zanthoxylum rhoifolium, Anadenanthera peregrina var. falcata, Tabebuia impetiginosa, Aspidosperma cf. subincanum, Astronium urundeuva, Lacistema aggregatum, Dilodendron bipinnatum, Astronium fraxinifolium, Guarea guidonia (= Guarea trichilioides), Acrocomia sclerocarpa, Callisthene fasciculata*. The Chiquitano forests share mostly the same species with a few others such as *Eriotheca roseorum, Guibourtia chodatiana, Holocalyx balansae, Machaerium scleroxylon, Piptadenia viridiflora, Peltogyne heterophylla, Platypodium elegans, Pseudobombax marginatum, Pterogyne nitens, Acosmium cardenasii, Talisia esculenta, Ocotea cernua, Nectandra megapotamica, Lonchocarpus nudiflorens, Cedrela fissilis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-09-10 | M569 Chiquitano Seasonal Dry Forest Macrogroup | M569 split between M570 and M872 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ek. Brazilian-Parana Dry Forest

M568. Brazilian Atlantic Seasonal Dry Forest

Type Concept Sentence: Seasonal semi-deciduous forests of the eastern Brazilian Shield, fringing the Atlantic evergreen and semi-evergreen forests in transition to the Cerrado and the Caatinga to the west. Also occupy favorable sites within the Agreste and the Caatinga. Among the common species are *Allophylus sericeus, Aloysia virgata, Apeiba tibourbou, Aspidosperma macrocarpon, Astronium urundeuva, Basiloxylon brasiliense, Cavanillesia arborea, Cedrela fissilis, Chorisia speciosa, Luehea divaricata, Phyllanthus acuminatus*, and *Schinopsis brasiliensis*. The forests transitional to the Cerrado in Parana and Sao Paulo states are associated with poor, sandy soils and their composition has more affinities with the Cerrado flora (i.e., *Acosmium dasycarpum, Acrocomia totai, Agonandra brasiliensis, Alibertia concolor, Alibertia macrophylla, Anadenanthera peregrina, Astronium fraxinifolium, Callisthene major*).

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ek. Brazilian-Parana Dry Forest (D221)

Elcode: M568

\*Scientific Name: Brazilian Atlantic Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Brazilian Atlantic Seasonal Dry Forest Macrogroup

\*Colloquial Name: Brazilian Atlantic Seasonal Dry Forest

\*Type Concept: Seasonal semi-deciduous forests of the eastern Brazilian shield, fringing the Atlantic evergreen and semi-evergreen forests in transition to the Cerrado and the Caatinga to the west, and also occupying favorable sites within the Agreste and the Caatinga. Those to the west of the Caatinga usually are on nutrient-rich soils derived from limestones. Among the common species are *Apeiba tibourbou, Basiloxylon brasiliense, Luehea divaricata, Molopanthera paniculata, Phyllanthus acuminatus, Cnidoscolus urens, Hymenaea courbaril, Chorisia speciosa, Cereus calcirupicola, Allophylus sericeus, Aloysia virgata, Cavanillesia arborea, Cedrela fissilis, Schinopsis brasiliensis, Astronium urundeuva, Aspidosperma macrocarpon*. The forests transitional to the Cerrado in the states of Parana and Sao Paulo tend to be associated with poor sandy soils, and their composition is different, with more affinities with the Cerrado flora, i.e., *Acosmium dasycarpum, Acrocomia totai, Agonandra brasiliensis, Alibertia concolor, Alibertia macrophylla, Anadenanthera peregrina, Astronium fraxinifolium, Callisthene major, Dalbergia miscolobium, Diospyros hispida, Gomidesia lindeniana, Guatteria sellowiana, Luehea paniculata, Machaerium acutifolium, Margaritaria nobilis, Miconia* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.Ek. Brazilian-Parana Dry Forest

M571. Parana Seasonal Dry Forest

Type Concept Sentence: Semi-deciduous, subhumid and well-drained forests of the Parana floristic region in Paraguay transitional to the Chaco, but with a drier climate and more sandy substrates. Forest stature is lower with a more open canopy and with lower plant diversity than Chaco. Species diagnostic to this system include *Alchornea triplinervia, Apuleia leiocarpa, Copaifera langsdorfii, Cupania vernalis, Dendropanax cuneatus, Diatenopteryx sorbifolia, Hellieta apiculata, Holocalyx balansae, Luehea divaricata, Matayba alaeganoides, Nectandra megapotamica, Ocotea puberula, Plinia rivularis, Styrax leprosum*, and *Syagrus romanzoffiana*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.Ek. Brazilian-Parana Dry Forest (D221)

Elcode: M571

\*Scientific Name: Parana Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Parana Seasonal Dry Forest Macrogroup

\*Colloquial Name: Parana Seasonal Dry Forest

\*Type Concept: Semi-deciduous, sub-humid and well-drained forests of the Parana floristic region in Paraguay transitional to the Chaco, in a climate drier than that of the rest of the Parana floristic region and on more sandy substrates. The changes are manifested in the structure, which is shorter, with a more open canopy and lower plant diversity. The following list of species is diagnostic for this macrogroup: *Hellieta apiculata, Syagrus romanzoffiana, Ocotea puberula, Nectandra megapotamica, Apuleia leiocarpa, Copaifera langsdorfii, Alchornea triplinervia, Plinia rivularis (= Myrciaria rivularis), Holocalyx balansae, Dendropanax cuneatus, Luehea divaricata, Cupania vernalis, Matayba alaeganoides, Diatenopteryx sorbifolia, Styrax leprosum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.El. Tropical Andean Montane Dry Forest

D222. Tropical Andean Montane Dry Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.1.El. Tropical Dry Forest & Woodland (F003)

Elcode: D222

\*Scientific Name: Tropical Andean Montane Dry Forest Division

\*Common (Translated Scientific) Name: Tropical Andean Montane Dry Forest Division

\*Colloquial Name: Tropical Andean Montane Dry Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M575 | Bolivian-Tucuman Seasonal Dry Forest |
| M574 | Central Andean Seasonal Dry Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.El. Tropical Andean Montane Dry Forest

M575. Bolivian-Tucuman Seasonal Dry Forest

Type Concept Sentence: Semi-deciduous forests of the subhumid intermontane valleys of central south Bolivia (Santa Cruz, Chuquisaca and Tarija) and northwestern Argentina (south to Salta) in the floristic region known as Boliviano-Tucumano. Forests are dense to semi-dense with canopies 20-25 m high, frequent presence of woody lianas, and several subcanopy strata. Occurs at 800-1900 m elevation. Diagnostic species of the upper belt include *Anadenanthera macrocarpa, Cupania vernalis, Diatenopteryx sorbifolia, Erythrina falcata, Parapiptadenia excelsa, Terminalia triflora*, and *Tipuana tipu*. Characteristic species of the lower belt are *Anadenanthera macrocarpa, Astronium urundeuva, Caesalpinia pluviosa, Calycophyllum multiflorum, Cedrela fissilis, Eriotheca roseorum, Myroxylon peruiferum, Phyllostylon rhamnoides*, and *Xylosma pubescens*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.El. Tropical Andean Montane Dry Forest (D222)

Elcode: M575

\*Scientific Name: Bolivian-Tucuman Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Bolivian-Tucuman Seasonal Dry Forest Macrogroup

\*Colloquial Name: Bolivian-Tucuman Seasonal Dry Forest

\*Type Concept: Semi-deciduous forests of the subhumid intermontane valleys of central southern Bolivia (Santa Cruz, Chuquisaca and Tarija) and northwestern Argentina, south down to Salta, in the floristic region known as Boliviano-Tucumano, growing from 800-1900 m elevation. They are dense to semi-dense forests with canopy 20-25 m high, frequent presence of woody lianas, and several subcanopy strata. The following species are diagnostic in the upper belt: *Parapiptadenia excelsa, Tipuana tipu, Cupania vernalis, Diatenopteryx sorbifolia, Acacia polyphylla, Anadenanthera macrocarpa, Erythrina falcata, Terminalia triflora*, while the lower is characterized by *Calycophyllum multiflorum, Phyllostylon rhamnoides, Myroxylon peruiferum, Eriotheca roseorum, Caesalpinia pluviosa, Anadenanthera macrocarpa, Gleditsia amorphoides, Cedrela fissilis, Xylosma pubescens, Astronium urundeuva*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.1.El. Tropical Andean Montane Dry Forest

M574. Central Andean Seasonal Dry Forest

Type Concept Sentence: Semi-deciduous forests of the lower montane belt of the eastern slopes of the Andes from northern Peru to south-central Bolivia. The canopy is 20-25 m high, and the forests have several understory strata and abundant woody lianas. Two floristic compositions occur: a northern type restricted to the eastern portion of the Huancabamba - Maranon valley area of northern Peru and southern Ecuador, and a southern type in inter-Andean valleys of the Yungas from central Peru to Cochabamba department in Bolivia. Forest are characterized by numerous species shared with the Chiquitano deciduous forests of Santa Cruz, representing disjunct 'islands' of Brazilian-Paranense flora in the Yungas.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.1.El. Tropical Andean Montane Dry Forest (D222)

Elcode: M574

\*Scientific Name: Central Andean Seasonal Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Central Andean Seasonal Dry Forest Macrogroup

\*Colloquial Name: Central Andean Seasonal Dry Forest

\*Type Concept: Semi-deciduous, sub-humid forests distributed in the lower montane belt of the eastern slopes of the Andes from northern Peru to south-central Bolivia. They occur in areas with medium or moderate effect of orographic rainshadow. Structurally, they are partially deciduous forests with a dense canopy 20-25 m high and several levels of understory characteristically presenting abundant woody lianas. Relative to their floristic composition there are two groups: a northern and a southern one. The former is restricted to the eastern portion of the Huancabamba - Maranon valley area of northern Peru and southern Ecuador. The southern type occurs in inter-Andean valleys of the Yungas from central Peru to the Cochabamba department in Bolivia and are characterized by numerous species shared with the Chiquitano deciduous forests of Santa Cruz, representing disjunct "islands" of Brazilian-Paranense flora in the Yungas, of great biogeographical interest. Characteristic species are *Schinopsis brasiliensis, Cariniana estrellensis, Astronium urundeuva, Aspidosperma cylindrocarpon, Aspidosperma macrocarpon, Zeyheria tuberculosa, Ceiba boliviana, Ceiba pubiflora, Cereus tacuaralensis, Brasiliopuntia brasiliensis (= Opuntia brasiliensis), Maytenus ilicifolia, Hedyosmum angustifolium, Clusia ducuoides, Juglans boliviana, Hymenaea courbaril, Piptadenia buchtienii, Piptadenia viridiflora, Anadenanthera colubrina, Maclura tinctoria, Stylogine ambigua, Aiphanes aculeata, Cinchona calisaya, Cavanillesia umbellata, Apuleia leiocarpa, Caesalpinia floribunda, Cedrela fissilis, Cedrela lilloi, Centrolobium tomentosum, Chrysophyllum gonocarpum, Combretum leprosum, Lonchocarpus macrocarpus, Machaerium guanaiense, Kielmeyera paniculata, Physocalymma scaberrimum, Attalea phalerata, Gallesia integrifolia, Machaerium scleroxylon, Spondias mombin, Tabebuia ochracea, Tabebuia roseoalba, Amburana cearensis, Myrocarpus frondosus, Sweetia fruticosa, Pachystroma longifolium*, and *Copaifera langsdorfii*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1.A.2. Tropical Lowland Humid Forest

Tropical Lowland Humid Forest is dominated by broad-leaved evergreen trees, often with multiple complex strata and growth forms in lowland to submontane or premontane elevations with aseasonal to moderately seasonal rainfall and warm temperatures.

1. Forest & Woodland

1.A.2.Eg. Caribbean-Mesoamerican Lowland Humid Forest

D091. Caribbean-Mesoamerican Lowland Humid Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.2.Eg. Tropical Lowland Humid Forest (F020)

Elcode: D091

\*Scientific Name: Caribbean-Mesoamerican Lowland Humid Forest Division

\*Common (Translated Scientific) Name: Caribbean-Mesoamerican Lowland Humid Forest Division

\*Colloquial Name: Caribbean-Mesoamerican Lowland Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BS, BZ, CR, CU, DO, GT, HN, JM, MQ, MX, NI, PA, PR, SV, TT, VE, VI, XD

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low - Poorly Documented

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M281 | Caribbean Lowland Humid Forest |
| M578 | Mesoamerican Lowland Humid Forest |
| M873 | Mesoamerican Submontane Humid Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Eg. Caribbean-Mesoamerican Lowland Humid Forest

M281. Caribbean Lowland Humid Forest

Type Concept Sentence: These are moist forests with high canopy closure and usually without emergent trees. They are located in the lowlands of the Caribbean islands, in areas that do not have a regular dry season and usually with an average monthly rainfall of 100 mm or more, or where water stress is intermittent but very short.

Bosques húmedos con un dosel alto, cerrado y generalmente sin árboles emergentes. Se encuentra en las tierras bajas de las islas del Caribe, en áreas que no presentan una estación seca regular y generalmente con una precipitación promedio mensual de 100 mm o más, o donde el estrés hídrico es intermitente pero muy corto.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Eg. Caribbean-Mesoamerican Lowland Humid Forest (D091)

Elcode: M281

\*Scientific Name: Caribbean Lowland Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Caribbean Lowland Humid Forest Macrogroup

\*Colloquial Name: Caribbean Lowland Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Diversity of above-ground plant functional groups (species that share morphological, chemical, structural or life history characteristics) determines the role of biodiversity in ecosystem functioning such as nutrient cycling, forest regeneration and successional patterns. Diversity of animal functional groups determines a number of key ecological processes such as trophic structure, nutrient cycling, and the system's resilience to disturbance. Community composition/diversity /structure affects species diversity and several ecosystem-level processes. Gap dynamics provide light, the major environmental limiting factor to plant growth in the closed-canopy humid tropical forest, and maintains the forest in shifting mosaic steady state.

Biotic interactions: pollination (bees, butterflies, beetles, moths, bats, and hummingbirds) is important for reproductive success and pollinators influence the frequency and distribution pattern of plant species; seed dispersal is executed by fruit-eating birds, mammals and ants, is important for reproductive success, and seed dispersal agents affect food webs in tropical forests by making available reproductive resources to other consumers and influencing the frequency and distribution pattern of plant species, especially woody species; seed predation is important for reproductive success and seed predation affects population recruitment and establishment of diverse plant species (e.g., palms and legumes). Seed predators occasionally act as dispersers. Seed predation is a specialized form of herbivory. Vertebrates involved are often objects of hunting by humans. Herbivores, including insects, parasitic fungi, and vertebrates, affect vigor and mortality of plants of all sizes, especially understory seedlings, and influences food chain and species composition of understory. The presence of top predators controls the populations of small mammals and herbivores. Species diversity and composition of soil biota, e.g., mycorrhizae, fungi, microbes, soil mesofauna such as leaf-cutter ants, termites, nematodes, collembola, dung beetles, etc., are fundamental for nutrient cycling and soil structure.

Disturbance regimes from catastrophic natural causes, e.g., hurricanes, rare catastrophic floods, or multiple landslides, or volcanism, or earthquakes, rare extreme cold fronts, rare extreme droughts, are rare events that can be very important for ecological dynamics. Create canopy gaps of great size allowing pioneer species to colonize and initiate successional processes, e.g., hurricanes play a major role in landscape-scale dynamics of forests on Caribbean islands. Fire due to dry spell or prolonged dry seasons or human activities: Certain species might be maintained because of this big, very rare catastrophic event. For example, mahogany thrives on fire outbreaks. Background disturbances, such as small gaps, small landslides, downbursts, normal cold fronts, and normal seasonal precipitation variability. Important for creating and maintaining habitat heterogeneity and species and structural diversity, preventing competitive exclusion. Drives regeneration.

Spatial integration and coverage (e.g., connectivity by riparian habitats) allowing migration of animals and plants outside of lowland forest: Allow to define at landscape level integrity of ecosystem. Allow to assess the extent of potential for species extinction. Spatial integration important for species to maintain contact with all habitats required for life cycles.

Biogeochemical dynamics (referring to regional and global processes such as global warming, ozone depletion, CO2 concentration, atmospheric and soil pollution, etc.): Affects basic ecosystem functioning at both global and local levels. Soil type or fertility: Affects forest primary productivity and species richness. Soil type is also relevant to tree mortality rate, treefall frequency, forest regeneration mode, and stand turnover time (Hartshorn 1990).

ENVIRONMENT

Environmental Description: Major factors that determine variation in community types within lowland tropical moist forest include precipitation, temperature, topography, edaphic conditions, and natural disturbance. The amount of rainfall and length of dry season determine the occurrences of evergreen forest or seasonally dry forest. Yearly extreme temperature fluctuations result in cold-front stressed forests in southwestern Amazonia and the southern Atlantic region and non-cold-front stressed forests in Mexico and Central America.: Zonation may occur depending on whether the forest is on a plain, or rolling hills, or foothills of a mountain range. Edaphic conditions (soil quality or fertility) can create special community types. Forests on white sand soil, on clay soil, or over limestone/ultrabasic rock differ considerably in species composition. Natural disturbance includes hurricanes and landslides. Hurricanes are the most frequent causes of landslides.

DISTRIBUTION

\*Geographic Range: Northern part of eastern Cuba, northern Jamaica, eastern Dominican Republic, northern Puerto Rico, Trinidad and Tobago and the Lesser Antilles in small areas.

Parte norte de Cuba oriental, norte de Jamaica, el este de República Dominicana, el norte de Puerto Rico, Trinidad y Tobago y áreas pequeñas en las Antillas Menores.

Nations: BS, CU, DO, JM, MQ, PR, TT, VE, VI, XD

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low - Poorly Documented

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G455 | Caribbean Seasonal Evergreen Lowland Rainforest |
| G456 | Caribbean Evergreen Lowland Rainforest |
| G845 | Caribbean Lowland Ruderal Rainforest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-04 | M282 Caribbean Lowland Seasonal Evergreen Rainforest Macrogroup | M282 merged into M281 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Hartshorn, G. S. 1990. An overview of Neotropical forest dynamics. Pages 585-599 in: A. H. Gentry, editor. Four Neotropical rainforests. Yale University Press, New Haven.

1. Forest & Woodland

1.A.2.Eg. Caribbean-Mesoamerican Lowland Humid Forest

M578. Mesoamerican Lowland Humid Forest

Type Concept Sentence: Evergreen to semi-evergreen humid forests of the coastal plain (both Pacific and Caribbean), coastal ridges and inland lowlands and low hills of Central America, and the humid, tropical coasts of southern Mexico.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Eg. Caribbean-Mesoamerican Lowland Humid Forest (D091)

Elcode: M578

\*Scientific Name: Mesoamerican Lowland Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Mesoamerican Lowland Humid Forest Macrogroup

\*Colloquial Name: Mesoamerican Lowland Humid Forest

\*Type Concept: The macrogroup includes forests developed under conditions of high year-round precipitation, as well as those with a short dry season. They grow on soils of sedimentary (limestone) or igneous origin (ash or basalt), and metamorphic in some cases. These are very diverse, dense, 30-m high forests with emergents up to 40 m tall, with several strata, rich in palms, epiphytes and lianas. The composition varies based on their geographic location. Communities of the Caribbean basin side include *Anaxagorea costaricensis, Aspidosperma megalocarpon, Capparis pittieri, Carpotroche platyptera, Cassipourea elliptica, Dialium guianense, Magnolia yocoronte, Manilkara zapota, Pentaclethra macroloba, Virola guatemalensis, Virola koschnyi, Vochysia guatemalensis*, among many others. On the Pacific basin side, a sample of characteristic species includes *Alchornea costaricensis, Anacardium excelsum, Andira inermis, Apeiba aspera, Apeiba tibourbou, Ardisia cutteri, Aspidosperma megalocarpon, Brosimum utile, Brosimum utile, Carapa guianensis, Caryocar costaricense, Heisteria longipes, Huberodendron patinoi, Iriartea deltoidea, Iriartea gigantea, Manilkara zapota (= Achras zapota), Minquartia guianensis, Parkia pendula, Peltogyne purpurea, Poulsenia armata, Protium copal, Qualea paraensis, Scheelea rostrata, Schizolobium parahyba, Socratea exorrhiza, Sorocea pubivena, Symphonia globulifera, Talisia nervosa, Terminalia lucida, Tetragastris panamensis, Vantanea barbourii, Vatairea lundellii*, and *Welfia georgii*. The semi-evergreen forests of the Peten on limestone substrates include *Alseis yucatanensis, Ampelocera hottlei, Aspidosperma cruenta, Astronium graveolens, Orbignya cohune (= Attalea cohune), Bernoullia flammea, Brosimum alicastrum, Bursera simaruba, Calophyllum antillanum (= Calophyllum brasiliense), Clusia salvinii, Cordia dodecandra, Cupania belicensis, Cupania prisca, Crysophila stauracantha, Chione chiapasensis, Dendropanax arboreus, Drypetes laterifolia, Drypetes brownei, Eugenia capuli, Hirtella triandra (= Hirtella americana), Laetia thamnia, Lonchocarpus castilloi, Manilkara chicle, Matayba apetala (= Matayba oppositifolia), Metopium brownei, Omphalea oleifera, Pouteria amygdalina, Pouteria campechiana, Pouteria reticulata, Protium copal, Pseudobombax ellipticum, Pseudolmedia spuria, Sabal mauritiiformis, Schizolobium parahyba, Sebastiana longicuspis*, and *Simira salvadorensis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Diversity of above-ground plant functional groups (species that share morphological, chemical, structural or life history characteristics): Determines the role of biodiversity in ecosystem functioning such as nutrient cycling, forest regeneration and successional patterns. Diversity of animal functional groups: Such diversity determines a number of key ecological processes such as trophic structure, nutrient cycling, system's resilience to disturbance. Community composition/diversity /structure: Affects species diversity and several ecosystem-level processes. Gap dynamics: Provides light, the major environmental limiting factor to plant growth in the closed-canopy tropical forest, and maintains the forest in shifting mosaic steady state.

Biotic interactions: Pollination (bees, butterflies, beetles, moths, bats, and hummingbirds): Important for reproductive success: pollinators influence the frequency and distribution pattern of plant species. Biotic interactions: seed dispersal executed by fruit-eating birds (e.g., toucans and cotingas), mammals (e.g., tapirs, peccaries, monkeys, bats, etc.) and ants: Important for reproductive success: seed dispersal agents affect food webs in tropical forests by making available reproductive resources to other consumers and Influence the frequency and distribution pattern of plant species, especially woody species. The composite seed shadow generated by the entire forest is the base of the food chain for a large number of animals (Janzen 1983). Biotic interactions: seed predation (parrots, cracids, beetles, agoutis, etc.): Important for reproductive success: seed predation affects population recruitment and establishment of diverse plant species (e.g., palms and legumes). Seed predators occasionally act as dispersers. Seed predation is a specialized form of herbivory. Vertebrates involved are often objects of hunting by humans. Biotic interactions: herbivores including insects (e.g., caterpillars, leaf-cutter ants), parasitic fungi, and vertebrates (e.g., peccaries, tapirs, deer, some monkeys): Herbivory affects vigor and mortality of plants of all sizes, especially understory seedlings, and Influences food chain and species composition of understory. Biotic interactions: presence of top predators: Controls the populations of small mammals and herbivores. Army ants form an important ecological system as predators of insects and species complex that follow them (e.g., parasitic flies, birds etc.). Army ants are also critical for maintenance of vegetation structure. Species diversity and composition of soil biota, e.g., mycorrhizae, fungi, microbes, soil mesofauna such as leaf-cutter ants, termites, nematodes, collembola, dung beetles, etc.: Fundamental for nutrient cycling and soil structure. Species diversity and composition of understory vegetation: Determine the mechanism of forest regeneration and indicate the health of successional change.

Disturbance regimes from catastrophic natural causes, e.g., hurricanes (hurricanes occur between 10-20 degree north and south of Equator), rare catastrophic floods, or multiple landslides, or volcanism, or earthquakes, rare extreme cold fronts, rare extreme droughts: These are extremely rare events that can be very important for ecological dynamics. Create canopy gaps of great size allowing pioneer species, e.g., *Cercropia* sp. to colonize and initiate successional processes, e.g., hurricanes play a major role in landscape-scale dynamics of forests on Caribbean islands. Fire due to dry spell or prolonged dry seasons or human activities: Certain species might be maintained because of this big, very rare catastrophic event. For example, mahogany thrives on fire outbreaks. Background disturbances: Small gaps, small landslides, downbursts, normal cold fronts, and normal seasonal precipitation variability. Important for creating and maintaining habitat heterogeneity and species and structural diversity, preventing competitive exclusion. Drives regeneration. Spatial integration and coverage (e.g., connectivity by riparian habitats) allowing migration of animals and plants outside of lowland forest: Allow to define at landscape level integrity of ecosystem. Allow to assess the extent of potential for species extinction. Spatial integration important for species to maintain contact with all habitats required for life cycles. Biogeochemical dynamics (referring to regional and global processes such as global warming, ozone depletion, CO2 concentration, atmospheric and soil pollution, etc.): Affects basic ecosystem functioning at both global and local levels. Soil type or fertility: Affects forest primary productivity and species richness. Soil type is also relevant to tree mortality rate, treefall frequency, forest regeneration mode, and stand turnover time (Hartshorn 1990).

ENVIRONMENT

Environmental Description: These major factors determine variation in community types within lowland tropical moist forest. Precipitation: The amount of rainfall and length of dry season determine the occurrences of evergreen forest or seasonally dry forest. Temperature: Yearly extreme temperature fluctuations result in cold-front stressed forests in southwestern Amazonia and the southern Atlantic region and non-cold-front stressed forests in Mexico and Central America. Topography: Zonation may occur depending on whether the forest is on a plain, or rolling hills, or foothills of a mountain range. Edaphic conditions (soil quality or fertility) can create special community types. Forests on white sand soil, on clay soil, or over limestone/ultrabasic rock differ considerably in species composition. Natural disturbance includes earthquakes, hurricanes and landslides. Earthquakes or hurricanes are the most frequent causes of landslides. Earthquake prone areas cover Central America, while the hurricane belt stretches from Mexico to Central America, and from the Caribbean islands to Yucatan.

DISTRIBUTION

\*Geographic Range: Mexico and Central America.

Nations: BZ, CR, GT, HN, MX, NI, PA, SV

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

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\*References [Required if used in text]:

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1. Forest & Woodland

1.A.2.Eg. Caribbean-Mesoamerican Lowland Humid Forest

M873. Mesoamerican Submontane Humid Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Eg. Caribbean-Mesoamerican Lowland Humid Forest (D091)

Elcode: M873

\*Scientific Name: Mesoamerican Submontane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Mesoamerican Submontane Humid Forest Macrogroup

\*Colloquial Name: Mesoamerican Submontane Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BZ, CR, GT, HN, NI, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest

D224. Colombian-Venezuelan Lowland Humid Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.2.Eh. Tropical Lowland Humid Forest (F020)

Elcode: D224

\*Scientific Name: Colombian-Venezuelan Lowland Humid Forest Division

\*Common (Translated Scientific) Name: Colombian-Venezuelan Lowland Humid Forest Division

\*Colloquial Name: Colombian-Venezuelan Lowland Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, CR, EC, PA, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M581 | Choco-Darien Humid Forest |
| M582 | Western Ecuadorian Humid Forest |
| M580 | Catatumbo Magdalena Humid Forest |
| M579 | Guajiran Humid Forest |
| M583 | Llanos Humid Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest

M581. Choco-Darien Humid Forest

Type Concept Sentence: Rainforests that occur along the Pacific coast from southern Panama to northern Ecuador. Includes the forests of the non-flooded plains and those of the foothills of the Darien Mountains in Panama, and of the western Andes in Colombia and Ecuador, up to 600 m elevation. Also includes forests along the coast of the Gulf of Uraba in northwestern Colombia. Forests are evergreen, tall, hyper-humid, multi-strata, and have abundant palm trees. They have high biodiversity derived from the Darien and the Choco centers of endemism.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest (D224)

Elcode: M581

\*Scientific Name: Choco-Darien Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Choco-Darien Humid Forest Macrogroup

\*Colloquial Name: Choco-Darien Humid Forest

\*Type Concept: The macrogroup represents the rainforests that occur on the Pacific Coast from southern Panama to northern Ecuador and Colombia. It includes the forests of the lowland, non-flooded plains and those of the foothills of the Darien Mountains in Panama, and of the western Andes in Colombia and northwestern Ecuador, up to approximately 600-800 m elevation; it also includes the forests of the coast of the Gulf of Uraba, in northwest Colombia. These are evergreen, very tall, hyper-humid forests with several strata, and outstanding biodiversity richness from strongly characterized centers of endemism of the Darien and the Choco. Characteristic tree species are *Alchornea polyantha, Anacardium excelsum, Apeiba aspera, Billia columbiana, Brosimum utile, Castilla elastica ssp. costaricana (= Castilla panamensis), Cephaelis elata, Cephaelis elata, Cordia alliodora, Coussapoa eggersii, Dipteryx panamensis, Elaeagia utilis, Eschweilera awaensis, Eschweilera pachyderma, Eschweilera verruculosa, Exarata chocoensis, Grias* spp., *Guettarda chiriquense, Huberodendron patinoi, Humiriastrum procerum, Hyeronima oblonga, Malpighia glabra, Oenocarpus panamanus, Pentaclethra* spp., *Perebea guianensis, Pourouma aspera, Pourouma chocoana, Pseudolmedia laevigata, Sorocea* sp., *Symphonia globulifera, Tababuia* spp., *Terminalia amazonica, Virola dixonii, Virola* spp., *Weinmannia putumayensis, Wettinia radiata*. Palm species are abundant and dominate the understory, among them are *Attalea colenda, Jessenia polycarpa, Phytelephas seemanni, Phytelephas* spp., *Welfia regia*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: Chocó rainforest is the wettest region in the world with annual precipitation >=9000 mm, and is an important center of rainforest endemism.

DISTRIBUTION

\*Geographic Range: The macrogroup occurs on the Pacific Coast from southern Panama to northern Ecuador and Colombia.

Nations: CO, CR, EC, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest

M582. Western Ecuadorian Humid Forest

Type Concept Sentence: Evergreen to semi-evergreen humid forests of the coastal plain, coastal ridges and low Andean slopes of western Ecuador, from sea level to 300-400 m elevation. Although year-round precipitation is high, it is not as high as in the Choco. Some of these forests experience a dry season. They grow on soils of sedimentary or igneous origin (ash or basalt), mainly of the Latosols group with clayish texture and good organic matter content. Prominent tree species are *Brosimum utile, Carapa megistocarpa, Coussapoa eggersii, Dialyanthera otoba, Otoba cf. novogranatensis, Quararibea coloradorum, Virola dixonii*, and several palm species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest (D224)

Elcode: M582

\*Scientific Name: Western Ecuadorian Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Western Ecuadorian Humid Forest Macrogroup

\*Colloquial Name: Western Ecuadorian Humid Forest

\*Type Concept: Evergreen to semi-evergreen humid forests of the coastal plain, coastal ridges and low Andean slopes of western Ecuador, up to 300-400 m elevation. Although still developed under conditions of high year-round precipitation, the annual rainfall is not as high as in the Choco, and in part of their distribution, these forests experience a dry season. They grow on soils of sedimentary or igneous origin (ash or basalt), mainly of the Latosols group with clayish texture and good organic matter content. Prominent tree species are *Virola dixonii, Quararibea coloradorum, Otoba cf. novogranatensis, Dialyanthera otoba, Cespedesia spathulata, Brosimum utile, Aniba perutilis, Pourouma bicolor, Coussapoa eggersii, Coussapoa herthae, Perebea cf. angustifolia, Protium* sp., *Caryodaphnopsis theobromifolia, Daphnopsis oculta, Cedrela odorata, Carapa megistocarpa, Carapa nicaraguensis, Chrysophyllum argenteum, Chrysophyllum venezuelanense, Clarisia racemosa, Clarisia biflora, Guarea kunthiana, Matisia grandifolia, Matisia palenquiana*. Palms include *Aiphanes tricuspidata, Attalea colenda, Bactris gasipaes, Bactris setulosa, Jessenia bataua, Oenocarpus bataua, Oenocarpus mapora*. Semi-deciduous species include *Pseudobombax millei, Centrolobium ochroxylum, Sapindus saponaria, Zanthoxylum acuminatum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: EC

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest

M580. Catatumbo Magdalena Humid Forest

Type Concept Sentence: Dense, tall evergreen forests with a stature of 30-40 m, emergent trees as high as 60 m, and various strata. Partially and periodically flooded. Occurs along the southern shore of Lake Maracaibo and in the foothills of the Cordillera de Perija in Colombia. Forms part of the Catatumbo Refugia with important connections to the Amazonian flora. Found also in the lower Magdalena and Cauca valleys, and very localized in the lower slopes of the Sierra Nevada de Santa Marta in Colombia. Diagnostic species include *Acosmium panamensis, Anacardium excelsum, Cariniana pyriformis, Faramea capillipes, Gustavia hexapetala, Miconia barbinervis, Miconia mocquerysii, Pterygota colombiana, Sterculia apetala, Trichilia maynasiana, Trichilia pleeana*, and *Vochysia lehmannii*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest (D224)

Elcode: M580

\*Scientific Name: Catatumbo Magdalena Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Catatumbo Magdalena Humid Forest Macrogroup

\*Colloquial Name: Catatumbo Magdalena Humid Forest

\*Type Concept: Evergreen dense, tall forests 30-40 m high with emergents up to 60 m, and various strata. It is partially and periodically flooded and occurs at the southern shore of Lake Maracaibo and in adjacent parts of Colombia. It forms part of the Catatumbo Refugia with important connections to the Amazonian flora. It is found also in the lower Magdalena and Cauca valleys, and very localized in the lower slopes of the Sierra Nevada de Santa Marta. The following list of species is diagnostic for this macrogroup: *Cariniana pyriformis, Anacardium excelsum, Acosmium panamense, Gustavia hexapetala, Ceiba pentandra, Sterculia apetala, Trichilia pleeana, Trichilia maynasiana, Faramea capillipes, Miconia mocquerysii, Miconia barbinervis, Miconia nervosa, Pterygota colombiana, Vochysia lehmannii, Rhodospatha perezii, Spathiphyllum perezii, Pentaclethra macroloba, Calophyllum antillanum (= Calophyllum brasiliense), Parkia pendula, Tapirira guianensis, Carapa guianensis, Eschweilera microcalyx, Clathrotropis brachypetala, Humiriastrum colombianum, Protium pedicelatum, Pseudolmedia rigida, Couma macrocarpa, Pterocarpus officinalis, Swartzia cuspidata, Sterculia steyermarkii, Terminalia amazonia, Grias foetida, Iranthera ulei, Caryocar amygdaliferum, Swietenia macrophylla, Aspidosperma dugandii, Aspidosperma curranii, Bombacopsis quinata, Cedrela fissilis, Cedrela mexicana, Brosimum* sp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest

M579. Guajiran Humid Forest

Type Concept Sentence: Evergreen humid to hyper-humid forests with a stature of 25-30 m, many strata, and a dense understory consisting of palms and tree ferns. Occurs on coastal ridges of northern Venezuela. Its elevational range varies depending on the mountain range and slope aspect, but generally occurs between 500 and 1300-1500 m elevation on north-facing slopes and from 800-1600 m on south-facing slopes. Diagnostic species include *Bactris setulosa, Eschweilera trinitensis, Euterpe* spp., *Ficus apollinaris, Guapira ferruginea, Guarea kunthiana, Gustavia hexapetala, Gustavia parviflora, Heliocarpus popayanensis, Myrcianthes karsteniana, Nectandra pichurim, Pachira insignis, Poulsenia armata, Ruellia chrysantha, Turpinia heterophylla*, and *Zinowiewia australis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest (D224)

Elcode: M579

\*Scientific Name: Guajiran Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Guajiran Humid Forest Macrogroup

\*Colloquial Name: Guajiran Humid Forest

\*Type Concept: Evergreen humid to hyper-humid forest 25-30 m high with many strata and a dense understory with palms and tree ferns. It occurs on coastal ridges of northern Venezuela. Its altitudinal location varies depending on the mountain and the slope aspect, but generally between 500 and 1300-1500 m elevation on northern slopes and from 800-1600 m on southern slopes. Diagnostic species include *Bactris setulosa, Eschweilera trinitensis, Euterpe* spp., *Ficus apollinaris, Guapira ferruginea, Guarea kunthiana, Gustavia hexapetala, Gustavia parviflora, Heliocarpus popayanensis, Myrcianthes karsteniana, Nectandra pichurim, Pachira insignis, Poulsenia armata, Ruellia chrysantha, Turpinia heterophylla*, and *Zinowiewia australis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest

M583. Llanos Humid Forest

Type Concept Sentence: Forests of the altitudinal gradient ranging from the Llanos lowlands to the lower eastern Andean slopes, up to 600 m elevation. These diverse forests are distributed from northern Venezuela to central Colombia where climates range from very humid to seasonal. In general, they grow on rich Quaternary deposits, with well-drained soils from medium and low alluvial fans that form terraces, tables and hills. Characteristic species are *Attalea maracaibensis, Bombacopsis quinata, Calycophyllum candidissimum, Cochlospermum vitifolium, Couroupita guinanensis, Luehea cymulosa, Luehea ferruginea, Platymiscium pinnatum, Pradosia caracasana, Sloanea terniflora*, and *Symmeria paniculata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Eh. Colombian-Venezuelan Lowland Humid Forest (D224)

Elcode: M583

\*Scientific Name: Llanos Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Llanos Humid Forest Macrogroup

\*Colloquial Name: Llanos Humid Forest

\*Type Concept: This macrogroup includes the forest of the altitudinal gradient from the Llanos lowlands to the lower eastern Andean slopes, up to 600 m elevation. In the long belt they are distributed from northern Venezuela to central Colombia. They cover a wide elevational range and climates from very humid to seasonal, therefore the forests included are diverse. In general, they grow on rich Quaternary deposits, with well-drained soils from medium and low alluvial fans, which currently form terraces, tables and hills. Characteristic species are *Attalea maracaibensis, Bombacopsis quinata, Calycophyllum candidissimum, Couroupita guinanensis, Guazuma ulmifolia, Luehea ferruginea, Luehea cymulosa, Pradosia caracasana, Cochlospermum vitifolium, Genipa americana, Platymiscium pinnatum, Symmeria paniculata, Sloanea terniflora, Swietenia macrophylla, Tabebuia chrysantha, Sapium biglandulosum, Pterocarpus acapulcensis, Rupechtria ramiflora, Sorocea sprucei, Guatteria pilosula, Syagrus sancona, Trichanthea gigantea, Clarisia biflora, Spondias mombin, Celtis iguanaea, Astronium graveolens, Guazuma ulmifolia, Trichilia* spp. In the upper part of their distribution are *Protium heptaphyllum, Vochysia lehmannii, Inga spuria, Ardisia foetida, Clusia minor, Ficus* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ei. Guianan Lowland Humid Forest

D225. Guianan Lowland Humid Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.2.Ei. Tropical Lowland Humid Forest (F020)

Elcode: D225

\*Scientific Name: Guianan Lowland Humid Forest Division

\*Common (Translated Scientific) Name: Guianan Lowland Humid Forest Division

\*Colloquial Name: Guianan Lowland Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO?, GF, GY, SR, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M586 | Eastern Guianan Humid Forest |
| M585 | Central Guianan Humid Forest |
| M584 | Western Guianan Humid Forest |
| M587 | Orinoquian Humid Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ei. Guianan Lowland Humid Forest

M586. Eastern Guianan Humid Forest

Type Concept Sentence: Evergreen forests of Guyana and Surinam with canopies averaging 25-40 m high with emergents reaching up to 60 m. These forests are in part seasonal and include both mixed forests with no clear dominant species and monodominant forests that probably result from infertile soils. Typical species include *Alexa imperatricis, Couratari coriacea, Dicymbe corimbosa, Dinizia excelsa, Eperua falcata, Eschweilera sagotiana, Goupia glabra, Licania heteromorpha, Licania laxiflora, Licania venosa, Mora gonggrijpii, Parinari excelsa, Pentaclethra macroloba, Protium decandrum, Quiina indigofera*, and numerous palm species. Also included are semi-deciduous forests of lower statured that grow on poor, coarse sand soils.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ei. Guianan Lowland Humid Forest (D225)

Elcode: M586

\*Scientific Name: Eastern Guianan Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Eastern Guianan Humid Forest Macrogroup

\*Colloquial Name: Eastern Guianan Humid Forest

\*Type Concept: Evergreen forests of Guyana and Surinam, 25-40 m tall, some of them with emergents up to 60 m. These forests are in part seasonal and include, in addition to mixed forests with no clear dominant species, a number of communities with a single dominant, probably linked to infertile soils or a combination of soils and topography. Some of the typical species are *Licania venosa, Licania laxiflora, Licania heteromorpha, Mora gonggrijpii, Eschweilera sagotiana, Protium decandrum, Pentaclethra macroloba, Quiina indigofera, Alexa imperatricis, Goupia glabra, Eperua falcata, Parinari excelsa, Couratari coriacea, Dinizia excelsa, Dicymbe corimbosa*, and numerous palm species such as *Jessenia bataua, Geonoma paniculigera, Oenocarpus bacaba, Attalea sagotti, Iriartea hexorrhiza, Astrocaryum sciophilum*. The macrogroup includes also edafoxerophyllous, semi-deciduous smaller forests which grow on poor white, coarse sand soils.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: GF, GY, SR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ei. Guianan Lowland Humid Forest

M585. Central Guianan Humid Forest

Type Concept Sentence: Humid, evergreen forests of the peneplain of the Caura-Paragua river basins occurring on well-drained or occasionally flooded Ultisols. The canopy averages 15-18 m high, with emergent trees reaching 30 m. Diagnostic species are *Catostemma commune, Dialium guianense, Eschweilera subglandulosa, Gustavia coriacea, Lecythis corrugata, Micrandra minor, Oenocarpus bacaba, Protium sagotianum*, and *Simaba cedron*. To the east, this vegetation type also includes the foothill forests of the Gran Sabana plateau in Venezuela and Brazil and the Pakaraima and Roraima mountains of Guyana. Characteristic species are *Brownea coccinea, Crudia oblonga, Eschweilera sagotiana, Licania heteromorpha, Licania venosa*, and *Mora gonggrijpii*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ei. Guianan Lowland Humid Forest (D225)

Elcode: M585

\*Scientific Name: Central Guianan Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Central Guianan Humid Forest Macrogroup

\*Colloquial Name: Central Guianan Humid Forest

\*Type Concept: The macrogroup includes the humid forests of the peneplain of the Caura-Paragua river basins on well-drained or occasionally flooded Ultisols. Evergreen and dense forest, of medium height (15-18 m average), but with emerging trees up to 30 m and relatively few small trees. Diagnostic composition includes *Gustavia coriacea, Simaba cedron, Dialium guianense, Protium sagotianum, Alexa confusa, Oenocarpus bacaba, Bocageopsis multiflora, Lecythis corrugata, Micrandra minor, Eschweilera subglandulosa, Catostemma commune*. To the east in Venezuela and Brazil, it also includes the piedmontane forests of the Gran Sabana plateau and in Guyana those of the Pakaraima and Roraima mountains, with red soils derived from volcanic intrusive rocks; some of these soils can be derived from the underlying laterite. Among the characteristic species of this type are *Crudia oblonga, Brownea coccinea, Icania venosa, Licania laxiflora, Licania heteromorpha, Mora gonggrijpii, Eschweilera sagotiana, Protium decandrum, Pentaclethra macroloba, Quiina indigofera*, and *Alexa imperatricis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, GY, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ei. Guianan Lowland Humid Forest

M584. Western Guianan Humid Forest

Type Concept Sentence: Forests of the westernmost extension of the Guianan rainforest in Brazil, Colombia, and Venezuela. Forests of the Colombian Guainía region are of lower stature and more interdigitated with white sand savannas and shrublands than those further east, whereas those of the upper Orinoco basin, including the Caura basin in Venezuela, are dense, tall forests with a rather open understory. The following species and genera are typical: *Aldina macrophylla, Eperua leucantha, Micrandra spruceana, Calliandra, Cladonia, Clusia, Eperua, Gustavia, Hevea, Humiria, Ilex, Micrandra, Monopteryx, Ormosia, Pradosia*, and *Qualea*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ei. Guianan Lowland Humid Forest (D225)

Elcode: M584

\*Scientific Name: Western Guianan Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Western Guianan Humid Forest Macrogroup

\*Colloquial Name: Western Guianan Humid Forest

\*Type Concept: Forests of the westernmost extension of the Guianan rainforest in Brazil, Colombia, and Venezuela. The rainforests of the upper Orinoco basin, including the Caura basin in Venezuela, are dense tall forests with a rather open understory. Representative species are *Lecointea amazonica, Clathrotropis glaucophylla, Peltogyne venosa, Erisma uncinatum, Oenocarpus, Socratea, Leopoldinia, Ocotea* spp., *Nectandra* spp. The forests in the Colombian Guainia region are of lower stature and more interdigitated with white sand savannas and shrublands. In their composition the following species and genera are typical: *Eperua leucantha, Aldina macrophylla, Micrandra spruceana, Hevea, Qualea, Clusia, Eperua, Micrandra, Humiria, Ilex, Ormosia, Pradosia, Calliandra, Cladonia, Gustavia, Monopteryx*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO?, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ei. Guianan Lowland Humid Forest

M587. Orinoquian Humid Forest

Type Concept Sentence: Upland forests of the Orinoco Delta and those of the valleys of the lower reaches of tributary streams. In general, these forests occupy non-flooded plains and low hills, although lower-elevation tracts are flooded temporarily or sporadically. Canopies are up to 25-30 m tall, generally evergreen and with three arboreal strata. Palms are abundant and in lower or less well-drained sites, and the legume *Mora excelsa* is often dominant.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ei. Guianan Lowland Humid Forest (D225)

Elcode: M587

\*Scientific Name: Orinoquian Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Orinoquian Humid Forest Macrogroup

\*Colloquial Name: Orinoquian Humid Forest

\*Type Concept: The macrogroup includes upland forests of the Orinoco Delta and those of the valleys of the lower reaches of tributary streams of the Orinoco. In general it occupy non-flooded plains and low hills, but the lower parts are flooded temporarily or sporadically. Forests are up to 25-30 m tall, generally evergreen and with three arboreal strata. Palms are abundant and in lower or less drainage sites *Mora excelsa* is clearly dominant.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: GY, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ej. Amazonian Lowland Humid Forest

D226. Amazonian Lowland Humid Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.2.Ej. Tropical Lowland Humid Forest (F020)

Elcode: D226

\*Scientific Name: Amazonian Lowland Humid Forest Division

\*Common (Translated Scientific) Name: Amazonian Lowland Humid Forest Division

\*Colloquial Name: Amazonian Lowland Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M593 | Central Amazon Humid Forest |
| M592 | Northern Amazon Humid Forest |
| M594 | Southern Amazon Humid Forest |
| M590 | Southwestern Amazon Lowland Humid Forest |
| M591 | Southwestern Amazon Subandean Humid Forest |
| M588 | Western Amazon Lowland Humid Forest |
| M589 | Western Amazon Subandean Humid Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ej. Amazonian Lowland Humid Forest

M593. Central Amazon Humid Forest

Type Concept Sentence: Rainforests distributed in the central and lower Amazon Basin east of Manaus in the interfluves along the main stem and the northern Uatuma Trombetas region. Forests are very tall, diverse and multi-layered, with emergents up to 40 m tall and many epiphytes and lianas.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ej. Amazonian Lowland Humid Forest (D226)

Elcode: M593

\*Scientific Name: Central Amazon Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Central Amazon Humid Forest Macrogroup

\*Colloquial Name: Central Amazon Humid Forest

\*Type Concept: Evergreen Amazon forests distributed in the central and lower Amazon Basin east of Manaus, in the interfluves along the main stem and towards the northern Uatuma Trombetas region. Very tall, diverse and multi-layered forest, with emergents up to 40 m tall and rich in epiphytes and lianas.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ej. Amazonian Lowland Humid Forest

M592. Northern Amazon Humid Forest

Type Concept Sentence: Rainforests of the sedimentary plains of the northwestern Amazon region. In Colombia they are represented by the forests in the Caqueta, Guaviare, Apaporis, and Vaupes river basins. These are tall, evergreen, dense forests of interfluves and high, well-drained riverbanks. Common species include *Astrocaryum aculeatum, Caryocar glabrum, Clathrotropis macrocarpa, Clusia spathulifolia, Couma catingae, Dacryodes cf. roraimensis, Goupia glabra, Leopoldinia piassaba, Mauritia carana, Mezilaurus itauba, Pouteria ucuqui, Protium grandifolium, Rhodognaphalopsis brevipes, Scleronema micranthum, Sloanea aff. macroana, Socratea exorrhiza, Swartzia schomburgkii, Tachigali aff. paniculata, Virola calophylloidea*, and many other palms.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ej. Amazonian Lowland Humid Forest (D226)

Elcode: M592

\*Scientific Name: Northern Amazon Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Northern Amazon Humid Forest Macrogroup

\*Colloquial Name: Northern Amazon Humid Forest

\*Type Concept: Rainforests of the sedimentary plains of the northwestern Amazon region; in Brazil they are distributed in the basin of the Japura and Negro rivers, up to the limit of the white sands Guianan forests in Venezuela, including in this area semi-evergreen forests of the northern fringe of the Amazonian region in transition to more seasonal forests in the north. In Colombia they are represented by the forests north of the Caqueta River up to the Guaviare and east in the basins of the Apaporis and Vaupes. These are tall, evergreen, dense forests of the interfluves and high, well-drained riverbanks. Among the common species are *Goupia glabra, Clathrotropis macrocarpa, Dacryodes cf. roraimensis, Sloanea aff. macroana, Pouteria ucuqui, Scleronema micranthum, Virola calophylloidea, Swartzia schomburgkii, Protium grandifolium, Mezilaurus itauba, Tachigali aff. paniculata, Mauritia carana, Rhodognaphalopsis brevipes, Couma catingae, Clusia spathulifolia, Dialium* sp., *Caryocar glabrum, Socratea exorrhiza, Astrocaryum aculeatum, Leopoldinia piassaba*, and many other palms.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ej. Amazonian Lowland Humid Forest

M590. Southwestern Amazon Lowland Humid Forest

Type Concept Sentence: Amazonian forests east and south of the Ucayali River in Peru, including the mid and lower basins of the Madre de Dios River in Peru and Bolivia and the area between the Jurua and Yavari rivers in Brazil. Although annual precipitation is high, these forests experience seasonality in rainfall. *Bertholletia excelsa* and *Hevea brasiliensis* inhabit these forests, which also include large tracts of mostly monodominant *Guadua* forests.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ej. Amazonian Lowland Humid Forest (D226)

Elcode: M590

\*Scientific Name: Southwestern Amazon Lowland Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Southwestern Amazon Lowland Humid Forest Macrogroup

\*Colloquial Name: Southwestern Amazon Lowland Humid Forest

\*Type Concept: Amazonian forests east and south of the Ucayali River in Peru, Madre de Dios mid and lower basin in Peru and Bolivia, and the areas between Jurua and Yavari in Brazil. Though very humid due to total annual precipitation, this region is characterized by its seasonality and because the topography is more irregular due to the presence of rolling plains and high hills like Serra do Divisor in the Purus area. It is the area of distribution of the Brazil nut or *Bertholletia excelsa*; other common species are *Hevea brasiliensis, Couratari guianensis, Couratari macrosperma, Jacaranda copaia ssp. spectabilis, Apuleia leiocarpa, Spondias mombin (= Spondias lutea), Caryocar villosum, Capirona decorticans, Heisteria nitida, Iryanthera juruensis, Dypteris odorata, Pseudolmedia macrophylla, Pseudolmedia laevis, Diploon cuspidatum, Parkia pendula, Copaifera reticulata, Castilla ulei, Swietenia macrophylla*, among many others. Included in this macrogroup are the very large extensions of mostly monodominant *Guadua* (bamboo) forests.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ej. Amazonian Lowland Humid Forest

M591. Southwestern Amazon Subandean Humid Forest

Type Concept Sentence: Humid to hyper-humid forests growing between 500 and 1000-1300 m elevation on the sub-Andean hills of the southwestern Amazon Basin in Peru and Bolivia. These forests occur on relatively poor, sandy loam soils that are well-drained. Characteristic species are *Apeiba membranacea, Cavanillesia hylogeiton, Clarisia biflora, Clarisia racemosa, Dipteryx odorata, Elaeagia mariae, Elaeagia obovata, Eschweilera andina, Eschweilera coriacea, Euterpe precatoria, Geonoma macrostachys, Iriartea deltoidea, Manilkara excelsa, Oenocarpus bataua, Sloanea fragrans, Sterculia apeibophylla*, and *Talauma boliviana*. Among the predominantly Amazonian floristic composition, some Andean elements such as *Elaeagia obovata, Ladenbergia magnifolia, Ladenbergia oblongifolia, Ladenbergia sericea, Podocarpus celatus, Podocarpus magnifolius, Prumnopitys harmsiana*, and *Weinmannia pinnata* are present.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ej. Amazonian Lowland Humid Forest (D226)

Elcode: M591

\*Scientific Name: Southwestern Amazon Subandean Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Southwestern Amazon Subandean Humid Forest Macrogroup

\*Colloquial Name: Southwestern Amazon Subandean Humid Forest

\*Type Concept: Humid to hyper-humid forests growing above 500 and up to 1000-1300 m elevation on the sub-Andean hills of the southwestern Amazon Basin in Peru and Bolivia. They have relatively poor, well-drained sandy loam soils. Characteristic species are *Apeiba membranacea, Cavanillesia hylogeiton, Clarisia biflora, Clarisia racemosa, Dipteryx odorata, Elaeagia mariae, Elaeagia obovata, Eschweilera andina, Eschweilera coriacea, Euterpe precatoria, Geonoma macrostachys, Iriartea deltoidea, Manilkara excelsa, Oenocarpus bataua, Sloanea fragrans, Sterculia apeibophylla*, and *Talauma boliviana*. Among the predominantly Amazonian floristic composition, some Andean elements such as *Elaeagia obovata, Ladenbergia magnifolia, Ladenbergia oblongifolia, Ladenbergia sericea, Podocarpus celatus, Podocarpus magnifolius, Prumnopitys harmsiana*, and *Weinmannia pinnata* are present.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ej. Amazonian Lowland Humid Forest

M588. Western Amazon Lowland Humid Forest

Type Concept Sentence: Rainforests of the Amazon Basin in southern Colombia, Ecuador, northwest of the Ucayali River in Peru, and west of the Japura River in Brazil. Very tall, multi-stratified evergreen forests, with abundant lianas and epiphytes, growing on different landforms, including riverbanks and higher terraces, peneplains, low hills and depressed, but well-drained terrain. These are among the forests with the greatest diversity of tree species. Most diversified or prominent among their floristic composition are members of the families Fabaceae, Myristicaceae, Bombacaceae, Meliaceae, Vochysiaceae, Lauraceae, Rubiaceae, and Arecaceae.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ej. Amazonian Lowland Humid Forest (D226)

Elcode: M588

\*Scientific Name: Western Amazon Lowland Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Western Amazon Lowland Humid Forest Macrogroup

\*Colloquial Name: Western Amazon Lowland Humid Forest

\*Type Concept: Rainforests of the Amazon Basin in southern Colombia, all of Ecuador, northwest of the Ucayali River in Peru, and west of the Japura River in Brazil. Very tall, multi-stratified evergreen forests, with abundant lianas and epiphytes, growing on different landforms, from riverbanks and higher terraces, to peneplains, low hills and also more depressed, but well-drained terrain. It is considered one of the most diverse forests in tree species. Most diversified or prominent among their floristic composition are members of the following families: Fabaceae, Myristicaceae, Bombacaceae, Meliaceae, Vochysiaceae, Lauraceae, Rubiaceae, and Arecaceae.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ej. Amazonian Lowland Humid Forest

M589. Western Amazon Subandean Humid Forest

Type Concept Sentence: Forests growing from 500 to 1000-1300 m elevation on the sub-Andean hills of the western Amazon Basin from Sierra de la Macarena in Colombia to central Peru. These are multi stratified forests 20-30 m tall,, growing in hyper-humid conditions on well-drained, somewhat acidic soils. The composition is typical of western Amazonian forests but with a few Andean elements from the genera *Miconia, Myrcia, Ocotea, Schefflera*, and *Weinmannia*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ej. Amazonian Lowland Humid Forest (D226)

Elcode: M589

\*Scientific Name: Western Amazon Subandean Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Western Amazon Subandean Humid Forest Macrogroup

\*Colloquial Name: Western Amazon Subandean Humid Forest

\*Type Concept: This macrogroup includes the forests growing above 500 and up to 1000-1300 m elevation on the sub-Andean hills of the western Amazon Basin from Sierra de la Macarena in Colombia to central Peru. These are 20-30 m tall, multi-stratified forests, growing in hyper-humid conditions, on well-drained, somewhat acidic soils. The composition is typical of western Amazonian forests but with a few Andean elements from the genera *Miconia, Myrcia, Ocotea, Schefflera*, and *Weinmannia*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

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1. Forest & Woodland

1.A.2.Ek. Brazilian-Parana Lowland Humid Forest

D227. Brazilian-Parana Lowland Humid Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.2.Ek. Tropical Lowland Humid Forest (F020)

Elcode: D227

\*Scientific Name: Brazilian-Parana Lowland Humid Forest Division

\*Common (Translated Scientific) Name: Brazilian-Parana Lowland Humid Forest Division

\*Colloquial Name: Brazilian-Parana Lowland Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M597 | Cerrado Humid Forest |
| M595 | Brazilian Atlantic Humid Forest |
| M596 | Parana Humid Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ek. Brazilian-Parana Lowland Humid Forest

M597. Cerrado Humid Forest

Type Concept Sentence: Moist to subhumid forests of the Cerrado and Chiquitania that transition to more humid Amazon forests. Also includes Cerrado forests with additional moisture availability such as riparian and gallery forests. The multi-strata forests can reach 25 m high, and grow on well-drained soil in seasonal climates. Species composition is predominantly from the Cerrado floristic region with Amazonian elements. Characteristic species are *Albizia niopoides, Cariniana estrellensis, Cedrela fissilis, Erytrochiton fallax, Hymenaea courbaril, Ocotea guianensis, Poeppigia procera, Protium heptaphyllum, Sapium marmieri, Sterculia apetala*, and in riparian situations *Apuleia leiocarpa, Callisthene major, Cariniana rubra, Cheiloclinum cognatum, Copaifera langsdorfii, Guarea kunthiana*, and *Guettarda viburnoides*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ek. Brazilian-Parana Lowland Humid Forest (D227)

Elcode: M597

\*Scientific Name: Cerrado Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Cerrado Humid Forest Macrogroup

\*Colloquial Name: Cerrado Humid Forest

\*Type Concept: The macrogroup includes moist to sub-humid forests of the Cerrado and Chiquitania in transitional locations to the Amazon Basin or with additional moisture availability in the case of riparian, gallery forests. Multi-strata forests that can reach 25 m high, growing on well-drained ground and in a seasonal but humid climate. The predominant composition is from the Cerrado floristic region but with Amazonian elements. Some of the characteristic species are *Ocotea guianensis, Spondias mombin, Physocalymma scaberrimum, Hymenaea courbaril, Poeppigia procera, Casearia gossypiosperma, Cordia alliodora, Cedrela fissilis, Chusquea ramosissima, Pourouma cecropiifolia, Erytrochiton fallax, Phenakospermum guianensis, Albizia niopoides, Attalea phalerata, Cariniana estrellensis, Gallesia integrifolia, Protium heptaphyllum, Sapium marmieri, Sterculia apetala, Inga laurina (= Inga fagifolia), Inga ingoides*, and in riparian situations *Apuleia leiocarpa, Copaifera langsdorfii, Hymenaea courbaril, Guettarda viburnoides, Callisthene major, Cariniana rubra, Cheiloclinum cognatum, Guarea guidonia, Guarea kunthiana*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ek. Brazilian-Parana Lowland Humid Forest

M595. Brazilian Atlantic Humid Forest

Type Concept Sentence: Lowland evergreen rainforests of the Brazilian Atlantic coastal plain and low slopes of the coastal ridge up to 200 m elevation. They are distributed from 6°S to almost 30°S latitude. Tall, multi-strata forests with dense shrubby undergrowth. Lianas and vascular epiphytes are abundant and diverse, as well as the herbaceous layer with numerous representatives of the Marantaceae and Strelitziaceae families. Several centers of endemism, with restricted-range plant and animal species, occur. Dominant families of the canopy layer are Fabaceae, Bignoniaceae, Meliaceae and Sapotaceae.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ek. Brazilian-Parana Lowland Humid Forest (D227)

Elcode: M595

\*Scientific Name: Brazilian Atlantic Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Brazilian Atlantic Humid Forest Macrogroup

\*Colloquial Name: Brazilian Atlantic Humid Forest

\*Type Concept: Lowland evergreen rainforests of the Brazilian Atlantic coastal plain and low slopes of the coastal ridge up to 200 m elevation. They are distributed in a belt from 6°S to almost 30°S latitude, and are currently very fragmented. They are tall, multi-layered forests, with a dense shrubby undergrowth. Lianas and vascular epiphytes are highly abundant and diverse, as well as the herbaceous layer, with numerous members of the Marantaceae and Strelitziaceae. Along this large latitudinal gradient, several centers of endemism developed with both plant and animal species with very restricted distributions. Overall, dominant families of the canopy layer are Fabaceae, Bignoniaceae, Meliaceae and Sapotaceae.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.2.Ek. Brazilian-Parana Lowland Humid Forest

M596. Parana Humid Forest

Type Concept Sentence: Subtropical humid to subhumid forests of southern Brazil, eastern Paraguay and northeastern Argentina. Forests have dense cover and are multi-strata and mostly evergreen, with a limited number of deciduous trees. Most of the distribution occurs on a basaltic plateau that abuts to the lower floodplains of the Parana and Uruguay rivers. A few hills are present, which are part of the Serra Geral ridge in Brazil. Although there are floristic affinities with the Brazilian Atlantic forests, characteristic tree species are *Apuleia leiocarpa, Astronium fraxinifolium, Cabralea canjerana, Cariniana estrellensis, Peltophorum dubium, Syagrus romanzoffiana*, and *Tabebuia heptaphylla*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.2.Ek. Brazilian-Parana Lowland Humid Forest (D227)

Elcode: M596

\*Scientific Name: Parana Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Parana Humid Forest Macrogroup

\*Colloquial Name: Parana Humid Forest

\*Type Concept: Subtropical humid to sub-humid forests of southern Brazil, eastern Paraguay and northeastern Argentina. Dense cover, multi-strata, mostly evergreen with a limited admixture of deciduous trees among the canopy and emergent species. Most of the distribution occurs on a basaltic plateau which abuts to the lower floodplains of the Parana and Uruguay rivers; a few hills or sierras are present which are part of the Serra Geral ridge in Brazil. Their strongest floristic affinity is with the Brazilian Atlantic forests, but it is a distinct assemblage of which some characteristic tree species are *Apuleia leiocarpa, Cabralea canjerana, Cedrela fissilis, Aspidosperma polyneuron, Tabebuia heptaphylla, Tabebuia impetiginosa, Anadenanthera colubrina, Astronium fraxinifolium, Syagrus romanzoffiana, Euterpe edulis, Annona amambayensis, Cariniana estrellensis, Machaerium stipitatum, Balfourodendron riedelianum, Parapiptadenia rigida, Peltophorum dubium, Patagonula americana, Pterogyne nitens, Cordia trichotoma, Enterolobium contortisiliquum, Myrocarpus frondosus, Matayba elaeagnoides, Allophylus edulis, Garcinia brasiliensis, Myrciaria rivularis, Alsophila cuspidata, Sorocea bonplandii*, among many others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1.A.3. Tropical Montane Humid Forest

Tropical Montane Humid Forest is dominated by broad-leaved evergreen trees, with increasingly small leaves and stems, often gnarly, with dense crowns as elevations increase. These forests are generally found within 23°N and S latitude of the equator between 1000 and 3500 m in elevation.

1. Forest & Woodland

1.A.3.Eg. Caribbean-Mesoamerican Montane Humid Forest

D228. Caribbean-Mesoamerican Montane Humid Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.3.Eg. Tropical Montane Humid Forest (F004)

Elcode: D228

\*Scientific Name: Caribbean-Mesoamerican Montane Humid Forest Division

\*Common (Translated Scientific) Name: Caribbean-Mesoamerican Montane Humid Forest Division

\*Colloquial Name: Caribbean-Mesoamerican Montane Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR?, CR, CU, DO, GT, HN, HT, JM, KN, MQ, MX, NI, PA, PR, SV, XC, XD

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low - Poorly Documented

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M598 | Caribbean Montane Humid Forest |
| M601 | Mesoamerican Montane Pine-Oak Forest |
| M600 | Mesoamerican Montane Humid Forest |
| M602 | Southern Mesoamerican Montane Humid Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-04 | D090 Caribbean & Central American Montane & Cloud Forest Division | replaced |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Eg. Caribbean-Mesoamerican Montane Humid Forest

M598. Caribbean Montane Humid Forest

Type Concept Sentence: In the Caribbean, forests between 700 and 1600 m altitude, grow on mountain summits that penetrate the base of trade wind clouds. Therefore, most of these forests are cloud forests. The cloud forest, variously called elfin woodland, mossy forest, montane thicket, or dwarf forest, is characterized by gnarled, open-crowned trees less than 7 m tall, high stem density, high basal area, small diameters, and slow growth rates, with greater abundance of epiphytes, palms, and tree ferns than lowland forests. Leaves tend to be coriaceous and grouped toward the ends of the branches. Dwarf stature of trees may be attributed to strong winds and water-saturated soils. Tree roots form a tight mat on the surface.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Eg. Caribbean-Mesoamerican Montane Humid Forest (D228)

Elcode: M598

\*Scientific Name: Caribbean Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Caribbean Montane Humid Forest Macrogroup

\*Colloquial Name: Caribbean Montane Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Landslides and hurricanes are the key triggers of dynamic processes of these forests. Substrate and topography and their interaction with the vegetation are the most important factors for the survival of these forests during hurricanes - probably the single most important natural trigger of the successional dynamic. Surviving trees have their roots securely anchored in the substrate. These factors are also critical for regulating surface runoff and maintaining the water balance under very humid conditions on exposed ridges and steep slopes. Forest recovery after disturbance is slow. Monitoring of dwarf forest in Puerto Rico's Luquillo Mountains showed that it can take up to 20 years for woody species to establish and after that their growth rate is very slow. It took almost 35 years until the canopy closing decreased the grass and fern cover (Weaver 2008). Moreover, the succession process is often subjected to setbacks due to periodic hurricane disturbance. This study also showed that hurricanes cause delayed mortality, with declines in biomass and stem numbers exceeding ingrowth during 15 years after Hurricane Hugo hit. Another important finding of this study is that more than half of the arborescent species growing in dwarf forest, where they play a prominent role in post disturbance recovery, are endemic to Puerto Rico (Weaver 2008). Cloud forests are known as places of high endemism but not necessarily as areas with rich biotas (Weaver 2000, 2008).

ENVIRONMENT

Environmental Description: Ecosystems of this macrogroup occur above 700 m elevation in areas with mean annual precipitation >1600 mm, frequently or seasonally surrounded by clouds, and on different topographies but mostly slopes, exposed ridges, and ravines. Forests growing on exposed areas are of smaller stature and very dense. Taller forests grow on protected areas on lower slopes to the leeward of ridges or spurs. With montane forests, one of the most critical climatic factors is the frequency and duration of the cloud cover; condensation can contribute 10% or more of the precipitation amount that these forests receive. In the Caribbean, the trade winds forming clouds have saline components which have an effect on the chemistry of the ecophysiology of these forests. Cloud cover causes less solar radiation, lower temperatures, decreased transpiration and lower photosynthetic rates, resulting in lower growth rates and lower nutrient-cycling rates. The efficiency shown by these forests in the use of nutrients is high though, which is important to avoid nutrient loss due to leaching (Silver et al. 2001).

DISTRIBUTION

\*Geographic Range: This type of forest is distributed in the Caribbean islands with mountains above 600-700 m elevation and on different geologies and substrates. This system is found in Cuba, Dominican Republic, Jamaica, Puerto Rico and mountainous islands of the Lesser Antilles.

Nations: CU, DO, HT, JM, KN, MQ, PR, XC, XD, XE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low - Poorly Documented

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G451 | Caribbean Montane Cloud Forest & Scrub |
| G449 | Caribbean Montane Rocky Riverine Scrub |
| G446 | Caribbean Moist Montane Mixed Pine - Broad-leaved Forest |
| G448 | Caribbean Wet Montane Forest |
| G447 | Caribbean Wet Montane Serpentine Forest & Scrub |
| G846 | Caribbean Montane Ruderal Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M599 Caribbean Montane Pine Forest Macrogroup | M599 concept covered by M598 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
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\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

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\*References [Required if used in text]:

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1. Forest & Woodland

1.A.3.Eg. Caribbean-Mesoamerican Montane Humid Forest

M601. Mesoamerican Montane Pine-Oak Forest

Type Concept Sentence: En Mesoamérica, los bosques de pino-encino se encuentran en México, Guatemala, Honduras y el norte de Nicaragua. Los árboles de pino nunca cruzaron la depresión nicaragüense durante la migración desde las regiones Holárticas hacia el Neotrópico.

In Meso-America, pine-oak forests are found in Mexico, Guatemala, Honduras and northern Nicaragua. Pine trees never crossed the Nicaraguan depression during migration from Holarctic regions into the Neotropics.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Eg. Caribbean-Mesoamerican Montane Humid Forest (D228)

Elcode: M601

\*Scientific Name: Mesoamerican Montane Pine-Oak Forest Macrogroup

\*Common (Translated Scientific) Name: Mesoamerican Montane Pine-Oak Forest Macrogroup

\*Colloquial Name: Mesoamerican Montane Pine-Oak Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Climate Regime (vertical and horizontal precipitation, temperature): Determines the occurrence and distribution of dominant flora and sets the boundaries for adjacent vegetation type. Slope stability and landslide regime: Slope stability determines the frequency of landslides triggered by earthquakes and high rainfalls. Landslide regime in turn determines landslide disturbance patterns and creates landscape heterogeneity. Fire regime: Affects vegetation structure. Affects vegetation or faunal composition. With altered fire regime, Increase pine's susceptibility to diseases and pests. Succession after disturbance (storms, hurricanes, landslides): Increases heterogeneity of vegetation structure and between-habitat (beta) diversity, important for patch dynamics. Hydrological regime and fluvial dynamics: Along with the cover and structure of the vegetation, hydrological regime and fluvial dynamics determine the water yield and runoff rates. Fluvial dynamics associated with large rainfall events provides mineral seedbeds for pine regeneration. Viable populations of frugivorous and granivorous species: Regulate seed dispersal of pioneer, secondary and primary forest tree and shrub species. Acorn specific and pine seed specific in pine/oak forest. Viable populations of mycorrhiza and fungal decomposers: Maintain decomposition and symbiotic relations with key tree species such as oak. Maintain the nutrient availability to species at ground level in closed forest. Vegetation structure (size, age class, strata): Provide diversity in micro-habitats and niches. Mean and Maximum Fire Disturbance Area: Fire is the principal disturbance regime and occurs with regularity.

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range: Mexico, Guatemala, Honduras and northern Nicaragua.

Nations: BR?, GT, HN, MX, NI, SV

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

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Horn, S. P., K. Orvis, L. M. Kennedy, and M. Clark. 2000. Prehistoric fires in the highlands of the Dominican Republic: Evidence from charcoal in soils and sediments. Caribbean Journal of Science 36:10-18.

1. Forest & Woodland

1.A.3.Eg. Caribbean-Mesoamerican Montane Humid Forest

M600. Mesoamerican Montane Humid Forest

Type Concept Sentence: Broadly defined as tropical forests occurring in lower montane (1000-2500 m elevation), upper montane (2500-3500 m), and subalpine (3500-3800 m) with mean annual precipitation between 1000 and 5000 mm and high relative humidity, with high proportions contributed by cloud or mist.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Eg. Caribbean-Mesoamerican Montane Humid Forest (D228)

Elcode: M600

\*Scientific Name: Mesoamerican Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Mesoamerican Montane Humid Forest Macrogroup

\*Colloquial Name: Mesoamerican Montane Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Régimen deslizamiento de tierra: múltiple por año de extensión areal variable crea patrón de vegetación. Sucesión tras deslizamiento de tierra: (de Ecuador Andes) géneros intolerantes a la sombra que se mantienen en derrumbes recientes, incluyendo *Blechnum, Equisetum, Piper, Baccharis, Senecio, Miconia*, y *Chusquea*. Régimen hidrológico: flujo / descarga o régimen de la erosión: la producción de agua y la tasa de escorrentía varía según la ubicación. Componentes faunísticos clave importantes para las redes alimentarias incluyen: roedores, colibríes, ranas, arañas y moluscos terrestres. Interacciones bióticas incluyen: tanques de bromelias de apoyo rica fauna incluyendo renacuajos e insectos. Agentes de polinización y dispersión: la diversidad de abejas y lepidópteros y taxones de plantas adaptadas a dípteros y la polinización colibrí; por ejemplo, los colibríes de Trochilinae abundantes en 1000-2000m elevación son polinizadores importantes para *Centropogon, Fuchsia, Vaccinieae*, y bromelias, los dípteros importantes para las orquídeas pleurothallid. Top depredadores regulan pequeñas poblaciones de mamíferos que red alimentaria impacto.

Landslide regime: multiple per year of variable areal extent, creates vegetation pattern. Succession following landslide: (from Ecuadoran Andes) shade-intolerant genera maintained in recent landslides, including *Blechnum, Equisetum, Piper, Baccharis, Senecio, Miconia*, and *Chusquea*. Hydrologic regime: flow/discharge or erosion regime: water yield and runoff rate varies by location. Key faunal components important for food webs include rodents, hummingbirds, frogs, spiders and terrestrial molluscs. Biotic interactions include bromeliad tanks supporting rich fauna including tadpoles and insects. Pollination and dispersal agents: diversity of bees and lepidopterans and plant taxa adapted to dipteran and hummingbird pollination; e.g., hummingbirds from Trochilinae abundant at 1000-2000m elevation are important pollinators for *Centropogon, Fuchsia, Vaccinieae*, and bromeliads, the dipterans important for pleurothallid orchids. Top predators regulate small mammal populations that impact food web.

ENVIRONMENT

Environmental Description: Régimen de humedad atmosférica: la precipitación media anual: 2000-4000mm; la niebla / nubes contribuyen 5-20% de la precipitación anual, alta humedad relativa anual >90%, con una media de temperatura anual: 6-22C. El relieve topográfico (posición de inclinación y estabilidad): Forma de relieve variable (acantilado, cresta, cóncavo / convexo pendiente más altos bosques nublados a menudo se encuentran en la posición media ladera con pendiente moderada y suelos más profundos.

Atmospheric moisture regime: mean annual rainfall: 2000-4000 mm; mist/clouds contributing 5-20% of annual precipitation. High annual relative humidity >90%. Mean annual temperature is 6-22°C. Topographic relief (slope position and stability): Variable landform (cliff, ridge, concave/convex slope). Tallest cloud forests often found on midslope position with moderate steepness and deeper soils.

DISTRIBUTION

\*Geographic Range: Sierra Madre Oriental of Mexico south to Honduras and Nicaragua

Nations: CR, GT, HN, MX, NI, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date: 08 Jan 2015

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1. Forest & Woodland

1.A.3.Eg. Caribbean-Mesoamerican Montane Humid Forest

M602. Southern Mesoamerican Montane Humid Forest

Type Concept Sentence: Los bosques de robles costarricenses son generalmente mono- o bi-específicos a nivel del dosel y albergan bambúes del género Chusquea en el sotobosque. Estos bosques son extremadamente mixtos en el sentido de que se componen tanto de elementos tropicales como templados, donde robles, alisos holárticos y conejos conviven con vegetación y fauna tropical. El volumen de madera y la biomasa son muy altos en estos bosques de roble de Costa Rica y se encuentran entre los valores más altos conocidos.

Costa Rican oak forests are generally mono- or bi-specific at the canopy level and harbor bamboos of the genus *Chusquea* in the understorey. Costa Rican oak forests are extremely mixed in the sense that they are made up of both temperate and tropical elements: holarctic oaks, alders, and rabbits occur together with tropical vegetation and fauna. Wood volume and biomass in these Costa Rican oak forests and are among the highest values known.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Eg. Caribbean-Mesoamerican Montane Humid Forest (D228)

Elcode: M602

\*Scientific Name: Southern Mesoamerican Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Southern Mesoamerican Montane Humid Forest Macrogroup

\*Colloquial Name: Southern Mesoamerican Montane Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: Las comunidades de los bosques de roble forman una zonificación distinguible a lo largo de gradientes de elevación. En Costa Rica, desde zonas más bajas hacia arriba, el roble comienza a dominar a unos 2000 m de altitud. Por encima de 2.000 m, en las partes altas del bosque montano bajo, el roble se encuentra como un género codominante, junto con especies de los géneros Ocotea y Nectandra. Por encima de c. 2300 m, hasta c. 3000 m, en las partes más bajas de la comunidad montano alta, el roble domina la capa de dosel (35 a 45 m) y se asocia con géneros montano bajos (por ejemplo, *Tovomitopsis, Hyeronima, Guarea, Sapium, Billia, Alfaroa* y *Phoebe*) en el la capa del subdosel (hasta 20 m) y con las palmas enanas (por ejemplo, *Chamaedorea* y *Geonoma*) y gesneriáceas en el sotobosque. Los bosques de roble son a menudo dominados por especies de *Quercus, Podocarpus* (una conífera) y *Magnolia* en el dosel, y *Weinmannia, Vaccinium, Viburnum, Ocotea, Prunus, Styrax, Symplocos, Cornus, Ilex, Miconia*, y Clusia en el subdosel. Aquí, el bambú *Chusquea* caracteriza el sotobosque. Por encima de c. 3000 m, hasta un máximo de 3.400 m, el bosque montano alto y las comunidades subalpinas de roble (altura máx. de 15 a 20 m) se acompaña del arbusto ericoide Comarostaphylis y géneros leñosos como *Schefflera, Gaiadendron, Drymis, Weinmannia, Vaccinium, Brunellia, Buddleja, Escallonia* y *Miconia*. Las epífitas abundan en todas las comunidades de los bosques de roble de montaña. Sin embargo, las orquídeas y bromelias epifitas dominan entre c. 2000 y c. 3000 m, mientras que los briófitos y líquenes se encuentran principalmente entre c. 2500 y 3400 m.

Oak forest communities form distinguishable zonation along elevation gradients. In Costa Rica, from lower elevations upward, oak starts to dominate at about 2000 m. Above 2000 m, in the upper parts of lower montane communities, oak is found as a codominant genus, together with lauraceaous species of genera *Ocotea* and *Nectandra*. Above about 2300 m and up to about 3000 m, in the lower parts of upper montane communities, oak dominates the canopy layer (35-45 m) and is associated with lower montane genera (e.g., *Alfaroa, Billia, Guarea, Hyeronima, Phoebe, Sapium, Tovomitopsis*) in the subcanopy layer (up to 20 m) and with dwarf palms (e.g., *Chamaedorea* and *Geonoma*) and gesneriads in the understorey. The oak forests are often dominated by species of *Quercus, Podocarpus* (a conifer), and *Magnolia* in the canopy, and *Cornus, Ilex, Miconia, Ocotea, Prunus, Styrax, Symplocos, Vaccinium, Viburnum, Weinmannia*, and the strangler *Clusia* in the subcanopy. Here, the *Chusquea* bamboo characterizes the understory. Above about 3000 m and up to a maximum of 3400 m, in the upper montane and subalpine communities, oak (maximum height 15-20 m) is accompanied by the ericad *Comarostaphylis* and genera such as *Brunellia, Buddleja, Drymis, Escallonia, Gaiadendron, Miconia, Schefflera, Vaccinium*, and *Weinmannia*. Epiphytes abound in all montane oak forest communities. However, epiphytic orchids and bromeliads dominate between about 2000 and 3000 m, while bryophytes and lichens are mainly found between about 2500 and 3400 m.

DISTRIBUTION

\*Geographic Range:

Nations: CR, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date: 08 Jan 2015

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\*References [Required if used in text]:

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1. Forest & Woodland

1.A.3.Eh. Guianan Montane Humid Forest

D229. Guianan Montane Humid Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.3.Eh. Tropical Montane Humid Forest (F004)

Elcode: D229

\*Scientific Name: Guianan Montane Humid Forest Division

\*Common (Translated Scientific) Name: Guianan Montane Humid Forest Division

\*Colloquial Name: Guianan Montane Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, GF, GY, SR, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M604 | Eastern Guianan Montane Humid Forest |
| M603 | Central Guianan Montane Humid Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Eh. Guianan Montane Humid Forest

M604. Eastern Guianan Montane Humid Forest

Type Concept Sentence: Complex, multi-strata rainforests occurring on metamorphic hills in the central and southern parts of the Eastern Guiana Shield in Guyana, Suriname and Brazil at 500 to 1200 m elevation. These forests can be found on narrow ridges with steep slopes or, more often, on broad and flat plateaus with shallow soils with lateritic gravel. Slope forests are on deep clay soils and are taller and denser. Plateau forests have a more open canopy with a lower stature. Characteristic species are *Amphirrhox longifolia, Aspidosperma* spp., *Spermacoce alata, Chimarrhis* sp., *Faramea lourteigiana, Leandra agrestis, Leandra divaricata, Parinari rodoplphii, Petrea macrostachya, Rheedia macrophylla, Rinorea* spp., *Stylosanthes guianensis*, and *Trattinnickia* spp.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Eh. Guianan Montane Humid Forest (D229)

Elcode: M604

\*Scientific Name: Eastern Guianan Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Eastern Guianan Montane Humid Forest Macrogroup

\*Colloquial Name: Eastern Guianan Montane Humid Forest

\*Type Concept: Complex, multi-strata rainforest distributed on metamorphic hills scattered in the central and southern parts of eastern Guiana, in Guyana, Suriname and Brazil between 500 and 1200 m elevation. The ridges can be narrow and very steep, but more often are broad and flat plateaus with shallow soils with lateritic gravel. The slopes are deep clay soils and support the taller, more dense forest, while the tops have a more open-canopy, lower forest. Characteristic species and genera of this forest are *Chimarrhis* sp., *Parinari rodoplphii, Pouteria* spp., *Trattinnickia* spp., *Aspidosperma* spp., *Rheedia macrophylla, Amphirrhox longifolia, Rinorea* spp., *Petrea macrostachya, Stylosanthes guianensis, Faramea lourteigiana, Psychotria pungens, Psychotria uliginosa, Leandra agrestis, Leandra divaricata, Spermacoce alata (= Borreria alata)*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR?, GF, GY, SR, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Eh. Guianan Montane Humid Forest

M603. Central Guianan Montane Humid Forest

Type Concept Sentence: Lower and upper montane humid forests of the central Guianan Highlands in Venezuela, Guyana and Brazil, including the slopes of the Tepuis, the Gran Sabana, and some interior plateaus of the massifs, from 400-2500 m elevation. Also included are relict Guianan forest on Colombian sierras. Forests are evergreen, with canopies that are 15-30 m high. At higher elevations, the forests are lower in stature and more open. Characteristic species for the lower montane type include *Matayba macrolepis, Rinorea guianensis*, and *Virola surinamensis*. Upper montane forests are dominated by the genera *Bonnetia, Clusia, Cyrilla, Matayba, Podocarpus, Sloanea*, and *Vochysia*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Eh. Guianan Montane Humid Forest (D229)

Elcode: M603

\*Scientific Name: Central Guianan Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Central Guianan Montane Humid Forest Macrogroup

\*Colloquial Name: Central Guianan Montane Humid Forest

\*Type Concept: Lower and upper montane forests of the central Guiana Highlands in Venezuela, Guyana and Brazil, on the slopes of the Tepuis and the Gran Sabana, and some interior plateaus of the massifs, from 400-2500 m elevation. Also included are those of the Guianan relict sierras in Colombia. These are evergreen, humid forests with sclerophyllous leaves and 15-30 m high; those of higher elevations are shorter and more open. Depending on the location, diagnostic species assemblages for the lower montane type are *Protium heptaphyllum, Parahancornia surrogata, Pleonostoma clematis, Roupala montana, Matayba macrolepis, Rinorea guianensis, Oenocarpus bataua, Macairea schultesii, Molongum nitidum, Schefflera aff. roraimae, Ocotea sp. Remijia* sp., or *Virola surinamensis, Licania alba, Licania densiflora, Parinari excelsa, Inga punctata, Mora gonggrijpii, Hymenaea courbaril, Clathrotropis brachypetala, Lecointea amazonica, Cedrela odorata, Erisma uncinatum, Qualea dinizii, Tabebuia stenocalyx*, while upper montane forests are dominated by genera *Bonnetia, Sloanea, Matayba, Vochysia, Podocarpus, Cyrilla racemiflora, Perissocarpa, Hedyosmum, Prunus, Schefflera, Vismia*, and *Clusia*, with some very restricted species endemics.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, GY, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ej. Tropical Andean Montane Humid Forest

D231. Tropical Andean Montane Humid Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.3.Ej. Tropical Montane Humid Forest (F004)

Elcode: D231

\*Scientific Name: Tropical Andean Montane Humid Forest Division

\*Common (Translated Scientific) Name: Tropical Andean Montane Humid Forest Division

\*Colloquial Name: Tropical Andean Montane Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M613 | Bolivian-Tucuman Lower Montane Humid Forest |
| M612 | Bolivian-Tucuman Montane & Upper Montane Humid Forest |
| M611 | Central Andean (Yungas) Lower Montane Humid Forest |
| M610 | Central Andean (Yungas) Montane & Upper Montane Humid Forest |
| M615 | Eastern Subandean Ridge Montane Humid Forest |
| M614 | Moist Puna Humid Forest |
| M607 | Northern Andean Lower Montane Humid Forest |
| M606 | Northern Andean Montane & Upper Montane Humid Forest |
| M609 | Northern Andean Venezuelan Coastal Ridge Forest |
| M608 | Northern Andean Santa Marta Montane Humid Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ej. Tropical Andean Montane Humid Forest

M613. Bolivian-Tucuman Lower Montane Humid Forest

Type Concept Sentence: Includes several types of Bolivian-Tucuman forests distributed in the sub-Andean belt of the eastern Andes from central Bolivia to northwestern Argentina. They occupy an elevational range from 600 to 1500-1900 m in seasonal, humid to subhumid areas. These are tall forests, with canopy heights of 25-30 m and several layers of understory and abundant epiphytes. They are dominated by evergreen and seasonally deciduous tree species, including *Blepharocalyx salicifolius, Cedrela lilloi, Citronella apogon, Cordyline dracaenoides, Juglans australis, Lonchocarpus lilloi, Nectandra angusta, Ocotea monzonensis, Phoebe porphyria, Roupala meissneri*, and *Tabebuia lapacho*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Ej. Tropical Andean Montane Humid Forest (D231)

Elcode: M613

\*Scientific Name: Bolivian-Tucuman Lower Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Bolivian-Tucuman Lower Montane Humid Forest Macrogroup

\*Colloquial Name: Bolivian-Tucuman Lower Montane Humid Forest

\*Type Concept: This macrogroup brings together several types of Bolivian-Tucuman forests, distributed in the sub-Andean belt of the eastern Andes, from central Bolivia to the northwest of Argentina. They occupy an altitudinal range from 600 m to 1500-1900 m elevation, in seasonal, humid to subhumid areas. These are tall forests, with a canopy 25-30 m high, several layers of understory and abundant epiphytes. They are dominated by evergreen and seasonally deciduous tree species. *Phoebe porphyria, Juglans australis, Nectandra angusta, Ocotea monzonensis, Cedrela lilloi, Tabebuia lapacho, Lonchocarpus lilloi, Cordyline dracaenoides, Blepharocalyx salicifolius, Roupala meissneri, Citronella apogon* are some of the common species.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ej. Tropical Andean Montane Humid Forest

M612. Bolivian-Tucuman Montane & Upper Montane Humid Forest

Type Concept Sentence: Evergreen to seasonally deciduous forests growing between 2000 and 4000 m elevation on the eastern slopes of the Andes from central Bolivia south to Catamarca Province in western Argentina. Upper montane forests have an open canopy and are dominated by *Polylepis* species (*Polylepis neglecta* and *Polylepis crista-galli* in Bolivia; *Polylepis australis* in Argentina). Forests occurring just above 2000 m have a more complex, multi-strata structure, a continuous canopy at 15-20 m height, and are more diverse, with the families Podocarpaceae and Myrtaceae dominant.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Ej. Tropical Andean Montane Humid Forest (D231)

Elcode: M612

\*Scientific Name: Bolivian-Tucuman Montane & Upper Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Bolivian-Tucuman Montane & Upper Montane Humid Forest Macrogroup

\*Colloquial Name: Bolivian-Tucuman Montane & Upper Montane Humid Forest

\*Type Concept: Evergreen to seasonally deciduous forests growing between 2000-4000 m elevation on the eastern slopes of the Andes from central Bolivia south to Catamarca province in western Argentina. Upper montane forests have an open canopy and are dominated by *Polylepis* species (*Polylepis neglecta, Polylepis crista-gallii*, in Bolivia; *Polylepis australis* in Argentina). Forests occurring just above 2000 m have a more complex, multi-strata structure, a continuous canopy at 15-20 m height, and are more diverse, with Podocarpaceae and Myrtaceae as dominant families.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ej. Tropical Andean Montane Humid Forest

M611. Central Andean (Yungas) Lower Montane Humid Forest

Type Concept Sentence: Forests growing between 1200-1400 m and 1700-2000 m elevation on the upper slopes and ridges of sub-Andean hills that are either exposed to the rains and mists (palm grove physiognomy) or have less steep slopes and deeper soils (forest physiognomy). Always in areas with humid to hyper-humid climates. Usually distributed on deep and well-drained humic soils. The variant dominated by the palm *Dictyocaryum lamarckianum* is less diverse, whereas the forest variant is floristically diverse. Characteristic species are *Ceiba boliviana, Cinchona* spp., *Cyathea* spp., *Escallonia pendula, Guatteria boliviana, Juglans boliviana, Ladenbergia* spp., *Mauria heterophylla, Nectandra cissiflora, Nectandra cuneato-cordata, Podocarpus oleifolius, Saurauia peruviana*, and *Toxicodendron striatum*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Ej. Tropical Andean Montane Humid Forest (D231)

Elcode: M611

\*Scientific Name: Central Andean (Yungas) Lower Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Central Andean (Yungas) Lower Montane Humid Forest Macrogroup

\*Colloquial Name: Central Andean (Yungas) Lower Montane Humid Forest

\*Type Concept: This macrogroup includes forests growing at 1200-1400 m and 1700-2000 m elevation. They occupy upper slopes and ridges of the sub-Andean hills, well exposed to the rains and mists (palm grove physiognomy) or less steep slopes and deeper soils (forest physiognomy), always in areas with humid to hyper-humid climate. It is usually distributed on deep and well-drained humic soils. The variant dominated by the palm *Dictyocaryum lamarckianum* is less diverse, while the diverse forest variant is extremely floristically diverse. Characteristic species are *Juglans neotropica, Juglans boliviana, Saurauia peruviana, Saurauia spectabilis, Podocarpus oleifolius, Mauria heterophylla, Toxicodendron striatum, Myroxylon balsamum, Nectandra cissiflora, Nectandra cuneato-cordata, Myrcia splendens, Myrcia fallax, Myrcia mollis, Ceiba boliviana, Escallonia pendula, Guatteria boliviana, Dendropanax arboreus, Protium heptaphyllum, Cinchona* spp., *Ladenbergia* spp., *Cyathea* spp., among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ej. Tropical Andean Montane Humid Forest

M610. Central Andean (Yungas) Montane & Upper Montane Humid Forest

Type Concept Sentence: Dense evergreen, multi-strata forests, 15-20 m tall, growing between about 2200 and 3500 m elevation on the eastern slopes of the Andes of Peru and Bolivia in humid to hyper-humid climates. Biomass of epiphytes and woody lianas is high. Floristic composition includes a base of tropical Andean tree genera (e.g., *Brunellia, Clusia, Hesperomeles, Ilex, Miconia, Myrsine, Oreopanax, Podocarpus*, and *Weinmannia*) with species composition and dominance varying by latitude. Includes also low, semi-sclerophyllous evergreen forest dominated by *Polylepis* species and growing between 3000 and 4500 m elevation on rugged Andean highlands, especially glacial cirques and slopes with boulders.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Ej. Tropical Andean Montane Humid Forest (D231)

Elcode: M610

\*Scientific Name: Central Andean (Yungas) Montane & Upper Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Central Andean (Yungas) Montane & Upper Montane Humid Forest Macrogroup

\*Colloquial Name: Central Andean (Yungas) Montane & Upper Montane Humid Forest

\*Type Concept: Dense, evergreen, 15-20 m tall, multi-strata forests growing between about 2200 and 3500 m elevation on the eastern slopes of the Andes of Peru and Bolivia under humid to hyper-humid climate. They hold a large biomass of epiphytes and woody lianas. In addition to a common floristic base of tropical Andean tree genera (i.e., *Podocarpus, Weinmannia, Oreopanax, Hesperomeles, Clusia, Miconia, Myrsine, Brunellia, Ilex*) species level composition and dominance vary along their latitudinal distribution. This macrogroup also includes low, semi-sclerophyllous, evergreen forest dominated by *Polylepis* species, growing between 3000 and 4500 m elevation on rugged Andean highlands, especially glacial cirques and slopes with boulders.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ej. Tropical Andean Montane Humid Forest

M615. Eastern Subandean Ridge Montane Humid Forest

Type Concept Sentence: Forests growing on steep and rugged topography of the lower eastern branches of the Cordillera Oriental in southeastern Ecuador and northeastern Peru. These forests usually occur from 1500 to 2200 m elevation in humid to hyper-humid conditions due to precipitation and fog, and situated on a variety of substrates including igneous and metamorphic rocks. Canopy cover is >70% and canopy height is 20-30 m. Forests can be interspersed with patches of several hectares dominated by one or a few species of tall trees (e.g., *Podocarpus oleifolius*) or shrubs (*Alzatea verticillata, Dictyocaryum lamarckianum, Graffenrieda emarginata*). Floristic composition predominantly consists of Andean genera.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Ej. Tropical Andean Montane Humid Forest (D231)

Elcode: M615

\*Scientific Name: Eastern Subandean Ridge Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Eastern Subandean Ridge Montane Humid Forest Macrogroup

\*Colloquial Name: Eastern Subandean Ridge Montane Humid Forest

\*Type Concept: This macrogroup covers forests growing on very steep and rugged topography of the lower eastern branches of the Cordillera Oriental in southeastern Ecuador and northeastern Peru, on igneous and metamorphic rocks and a wide range of substrates, usually between 1500 m and 2200 m elevation in humid to hyper-humid conditions due to precipitation and fog. Canopy cover is >70% and trees are 20-30 m tall, interspersed with patches of several hectares dominated by one or a few species of tall trees (i.e., *Podocarpus oleifolius*) or else shrublands (*Alzatea verticillata, Graffenrieda emarginata*, and the palm *Dictyocaryum lamarckianum*). Their floristic composition is predominantly of Andean genera, as compared with other forests in this belt which show a mixed Amazonian and Andean flora. The species assemblages include several diverse genera such as *Cinchona, Clusia, Beilschmiedia, Hieronyma, Mauria, Nectandra, Ocotea, Oreopanax, Siparuna, Weinmannia, Ceroxylon*, and many other palms. *Axinaea, Vismia*, and *Chusquea*, take over disturbed areas after landslides or mass movements.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
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Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ej. Tropical Andean Montane Humid Forest

M614. Moist Puna Humid Forest

Type Concept Sentence: Forests occurring at high elevations near the treeline in the ecotone with high Andean grasslands. Canopies are 3-10 m high and discontinuous, formed by *Polylepis* and other tree genera as well as shrubs. The open canopy allows the development of a dense herbaceous lower stratum that includes ferns. Characteristic woody species comprise several members of the genera *Polylepis, Buddleia, Barnadesia*, and *Oreopanax*, and the species *Berberis commutata, Berberis rariflora, Escallonia corymbosa, Gynoxys psilophylla, Hesperomeles pernettyioides, Mutisia weberbauerii*, and *Schinus microphyllus*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Ej. Tropical Andean Montane Humid Forest (D231)

Elcode: M614

\*Scientific Name: Moist Puna Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Moist Puna Humid Forest Macrogroup

\*Colloquial Name: Moist Puna Humid Forest

\*Type Concept: Forests occurring in high elevations at the treeline, in the ecotone with high Andean grasslands. They are 3-10 m tall and have a discontinuous canopy formed by *Polylepis* and other tree genera, as well as shrubs. The open canopy allows the development of a dense herbaceous lower stratum, including ferns. Characteristic woody species include several species of *Polylepis* and *Buddleia, Hesperomeles pernettyioides, Escallonia corymbosa, Mutisia weberbauerii, Oreopanax* spp., *Berberis commutata, Berberis rariflora, Gynoxys psilophylla, Schinus microphyllus, Barnadesia* sp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ej. Tropical Andean Montane Humid Forest

M607. Northern Andean Lower Montane Humid Forest

Type Concept Sentence: Dense, evergreen, multi strata and extremely diverse forests, 20-30 m tall, growing on hillsides and ridges of sub-Andean mountains or directly in the lower belt of the main cordillera, from 1000-1300 m to 2000-2200 m elevation, often covered by a layer of fog. Distributed on the western and eastern slopes of the Andes in Venezuela, Colombia and Ecuador with humid to hyper-humid climates. Palms are conspicuous components in some locations, especially *Dyctiocaryum lamarckianum, Dyctiocaryum schultzei*, and *Geonoma* spp. Other common genera are *Calatola, Caryodendron, Chrysochlamys, Clarisia, Gustavia, Hyeronima, Nectandra, Otoba, Ruagea*, and *Tovomita*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Ej. Tropical Andean Montane Humid Forest (D231)

Elcode: M607

\*Scientific Name: Northern Andean Lower Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Northern Andean Lower Montane Humid Forest Macrogroup

\*Colloquial Name: Northern Andean Lower Montane Humid Forest

\*Type Concept: Dense, evergreen, 20-30 m tall, multi-strata and extremely diverse forest. It grows on hillsides and ridges of sub-Andean mountains or directly in the lower belt of the main cordillera, from 1000-1300 m to 2000-2200 m elevation, often surrounded by a layer of fog. It is distributed on the western and eastern slopes of the Andes of Venezuela, Colombia and Ecuador under humid to hyper-humid climate. Palms are conspicuous components in some locations, especially *Dyctiocaryum lamarckianum, Dyctiocaryum schultzei*, and *Geonoma* spp. Other common genera are *Calatola, Caryodendron, Chrysochlamys, Clarisia, Gustavia, Hyeronima, Nectandra, Otoba, Ruagea*, and *Tovomita*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ej. Tropical Andean Montane Humid Forest

M606. Northern Andean Montane & Upper Montane Humid Forest

Type Concept Sentence: Dense, evergreen, multi-strata forests, 15-25 m tall, growing between about 2200 and 3800 m elevation on all versants of the Andean cordillera in Venezuela, Colombia, and Ecuador in humid to hyper-humid climates. They contain large biomasses of epiphytes. Forests in the lower belt of the range are taller and may have high densities of *Ceroxylon* palm trees, among other characteristic species. Forests in the upper belt tend to have lower canopies with a large proportion of trees with sclerophyllous and/or small leaves. Species composition and dominance vary according to elevation, latitude, and geographical region.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Ej. Tropical Andean Montane Humid Forest (D231)

Elcode: M606

\*Scientific Name: Northern Andean Montane & Upper Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Northern Andean Montane & Upper Montane Humid Forest Macrogroup

\*Colloquial Name: Northern Andean Montane & Upper Montane Humid Forest

\*Type Concept: Dense, evergreen, 15-25 m tall, multi-strata forests growing between about 2200 and 3800 m elevation on all versants of the Andean mountains in Venezuela, Colombia, Ecuador, and the northernmost tip of the Andes Western Cordillera in Peru, under humid to hyper-humid climate. They hold a large biomass of epiphytes. Forests in the lower belt of the range are taller and may show a high frequency of palm trees of the genus *Ceroxylon*, among other characteristic species such as *Hedyosmum bonplandianum, Ocotea calophylla, Brunnellia integrifolia, Ladenbergia macrocarpa, Retrophyllum rospigliosii, Billia columbiana, Clethra fagifolia*, and several species of *Oreopanax, Ilex, Persea, Cinchona, Clusia*, and *Weinmannia*. Forests in the upper belt tend to be shorter and have a large proportion of trees with sclerophyllous and/or small leaves. Genera common in the upper forests are *Polylepis, Escallonia, Hesperomeles, Weinmannia, Diplostephium, Libanothamnus, Espeletia, Gynoxis, Clethra, Ilex*, and *Miconia*. Species-level composition and dominance vary along their altitudinal and latitudinal distribution, and the branch of the Andes Cordillera.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ej. Tropical Andean Montane Humid Forest

M609. Northern Andean Venezuelan Coastal Ridge Forest

Type Concept Sentence: Forests occurring on coastal ridges of northern Venezuela. Its elevational range varies depending on the mountain and the slope aspect but is generally between 900 and 1500 m. An upper montane variant occurs in the Cordillera de la Costa and Sierra del Interior Central, above 1500 m. Diagnostic species include *Alchornea triplinervia, Cinchona henleana, Clethra lanata, Clusia multiflora, Dendropanax fendleri, Eschweilera fendleriana, Ficus* spp., *Geonoma* spp., *Graffenrieda latifolia, Hyeronima moritziana, Ladenbergia moritziana, Laplacea fruticosa, Podocarpus salicifolius, Protium tovarense, Prunus myrtifolia, Qualea calophylla, Myrsine coriacea,* and *Ruagea pubescens*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Ej. Tropical Andean Montane Humid Forest (D231)

Elcode: M609

\*Scientific Name: Northern Andean Venezuelan Coastal Ridge Forest Macrogroup

\*Common (Translated Scientific) Name: Northern Andean Venezuelan Coastal Ridge Forest Macrogroup

\*Colloquial Name: Northern Andean Venezuelan Coastal Ridge Forest

\*Type Concept: This macrogroup occurs on coastal ridges of northern Venezuela. Its altitudinal location varies depending on the mountain and the slope aspect but is generally found between 900 and 1500 m in elevation. An upper montane variant occurs in the Cordillera de la Costa and Sierra del Interior Central, above 1500 m. Diagnostic species include *Alchornea triplinervia, Cinchona henleana, Clethra lanata, Clusia multiflora, Dendropanax fendleri, Eschweilera fendleriana, Ficus* spp., *Geonoma* spp., *Graffenrieda latifolia, Hyeronima moritziana, Ladenbergia moritziana, Laplacea fruticosa, Podocarpus salicifolius, Protium tovarense, Prunus myrtifolia, Qualea calophylla, Myrsine coriacea (= Rapanea ferruginea)*, and *Ruagea pubescens*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ek. Brazilian-Parana Montane Humid Forest

D232. Brazilian-Parana Montane Humid Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.3.Ek. Tropical Montane Humid Forest (F004)

Elcode: D232

\*Scientific Name: Brazilian-Parana Montane Humid Forest Division

\*Common (Translated Scientific) Name: Brazilian-Parana Montane Humid Forest Division

\*Colloquial Name: Brazilian-Parana Montane Humid Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M616 | Brazilian Atlantic Montane Humid Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.3.Ek. Brazilian-Parana Montane Humid Forest

M616. Brazilian Atlantic Montane Humid Forest

Type Concept Sentence: Lower and upper montane rainforests, and montane *Araucaria angustifolia* forests of the Atlantic cordilleras of Brazil, including the Serra do Mar and its associated ridges and plateaus, Serra do Mantiqueira, Serra dos Organos, and coastal escarpments of the northeastern Brazilian Shield. These forests occur between approximately 800-2000 m elevation under very humid to humid seasonal climates. Trees in the legume family are dominant in both the lower montane forests of the southeast and northeast mountains, while upper montane Atlantic forests in the center and south are dominated by Myrtaceae, Melastomataceae, Proteaceae, Malpighiaceae, Cunoniaceae and Asteraceae, with a significant biomass of epiphytes.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.3.Ek. Brazilian-Parana Montane Humid Forest (D232)

Elcode: M616

\*Scientific Name: Brazilian Atlantic Montane Humid Forest Macrogroup

\*Common (Translated Scientific) Name: Brazilian Atlantic Montane Humid Forest Macrogroup

\*Colloquial Name: Brazilian Atlantic Montane Humid Forest

\*Type Concept: Lower montane, upper montane rainforests, and montane conifer forests of the Atlantic cordilleras of Brazil, including Serra do Mar and its associated ridges and plateaus, Serra do Mantiqueira, Serra dos Organos, and coastal escarpments of the northeastern Brazilian shield in the northeast states. Depending on the ridge elevation and location, these forests are located between approximately 800-2000 m altitude, under very humid to humid, seasonal climate. Tree species in the Fabaceae are dominant in both the lower montane forests of the southeast and northeast mountains, while upper montane Atlantic forests in the center and south are dominated by Myrtaceae, Melastomataceae, Proteaceae, Malpighiaceae, Cunoniaceae and Asteraceae, with a significant biomass of epiphytes thanks to high humidity and a well-developed understory with conspicuous arborescent ferns. This macrogroup also includes the *Araucaria angustifolia* forests occupying the high plateaus of the southernmost reach of the Brazilian Shield and the Misiones Planalto. The upper canopy reaches 30-45 m high, and the second stratum is dominated by members of the Lauraceae.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1.A.4. Tropical Flooded & Swamp Forest

Tropical Flooded & Swamp Forest is a forested or wooded wetland and peatland found in margins of freshwater lakes, alluvial plains, rivers and depressions around the globe.

1. Forest & Woodland

1.A.4.Ed. Caribbean-Central American Flooded & Swamp Forest

D093. Caribbean-Central American Flooded & Swamp Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.4.Ed. Tropical Flooded & Swamp Forest (F029)

Elcode: D093

\*Scientific Name: Caribbean-Central American Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Caribbean-Central American Flooded & Swamp Forest Division

\*Colloquial Name: Caribbean-Central American Flooded & Swamp Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BS, BZ, CO, CR, CU, DO, EC, GT, HN, MQ, MX, NI, PA, PR, SV, TT, US

States/Provinces: FL

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M618 | Caribbean Floodplain Forest |
| M617 | Caribbean Swamp Forest |
| M620 | Mesoamerican Floodplain Forest |
| M619 | Mesoamerican Coastal Plain Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ed. Caribbean-Central American Flooded & Swamp Forest

M618. Caribbean Floodplain Forest [Low - Poorly Documented]

Type Concept Sentence: Several types of seasonally flooded forests located on alluvial plains in climates that vary from very humid to seasonal and therefore the length of the flooding period influences the composition and structure of the included communities.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ed. Caribbean-Central American Flooded & Swamp Forest (D093)

Elcode: M618

\*Scientific Name: Caribbean Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Caribbean Floodplain Forest Macrogroup

\*Colloquial Name: Caribbean Floodplain Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Based on the length of the hydroperiod, flooded forests can be grouped into permanently inundated swamp forest and periodically inundated swamp forest. Swamp forest is usually found on soils that have a high water table, e.g., *Mauritia flexuosa* (palm) swamp in Trinidad grows on land perpetually inundated with 30 to 100 cm of water; while periodically-inundated swamp occurs in areas subjected to inundation during the rainy season. Species richness generally decreases with increasing hydroperiod. Based on the type of dominant species, swamp forests can be conveniently divided into two types: forests dominated by hardwood species and those dominated by palms. Dominance by palms becomes stronger with increasing hydroperiod or soil moisture conditions (Bacon 1990, Lugo et al. 1990).

Key Factors for evaluating integrity include hydrodynamics that are frequently altered by human uses: flood regime duration, magnitude and return interval of flooding should fall within historical ranges for the type, and channel dynamics, or the rate of change and/or lateral migration in riverine portions of swamps create habitat mosaics such as oxbow lakes, levees, seasonal lakes, canals, forested terraces, and associated successional patterns in vegetation. Water Quality: chemistry (pH, salinity gradient, N, C, P), transparency (suspended sediment, phytoplankton count, fish composition).

ENVIRONMENT

Environmental Description: Located on alluvial plains in climates that vary from very humid to seasonal.

DISTRIBUTION

\*Geographic Range:

Nations: BZ, CU, DO, GT, HN, NI, PR, TT

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low - Poorly Documented

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G459 | Caribbean Flooded Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-03-26 | M001 Caribbean & Central American Flooded & Swamp Forest Macrogroup | M001 split into M617 & M618 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

Bacon, P. R. 1990. Ecology and management of swamp forests in the Guianas and Caribbean region. Pages 213-250 in: A. E. Lugo, M. Brinson, and S. Brown, editors. Ecosystems of the World 15. Forested wetlands. Elsevier Scientific Publishing Company, New York.

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Lugo, A. E., S. Brown, and M. M. Brinson 1990. Synthesis and search for paradigms in wetland ecology. Pages 447-460 in: A. E. Lugo, M. Brinson, and S. Brown, editors. Ecosystems of the World 15. Forested wetlands. Elsevier Scientific Publishing Company, New York.

1. Forest & Woodland

1.A.4.Ed. Caribbean-Central American Flooded & Swamp Forest

M617. Caribbean Swamp Forest

Type Concept Sentence: This macrogroup represents freshwater forested wetlands that occur in relatively geographically restricted locations in southern Florida, Cuba and Puerto Rico, and possibly other Caribbean islands, where they are surrounded by sawgrass marsh and wet prairies. The extensive and flat terrain is a rainfall-driven and nutrient-poor fen peatland. The floristic composition is characterized by the combination of broad-leaved evergreen trees of tropical affinities, temperate broad-leaved deciduous trees, and, in Florida, may include the deciduous needle-leaved *Taxodium* spp.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ed. Caribbean-Central American Flooded & Swamp Forest (D093)

Elcode: M617

\*Scientific Name: *Sabal palmetto - Annona glabra - Pterocarpus officinalis* Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Cabbage Palmetto - Pond-apple - Terocarpo Swamp Forest Macrogroup

\*Colloquial Name: Caribbean Swamp Forest

\*Type Concept: This macrogroup includes tree-dominated, stillwater wetlands, including hydric hammock, and tree swamps that occur amidst low-lying marshes of south Florida, Cuba and Puerto Rico, and possibly other Caribbean islands. They represent either poorly drained depressions, emergent tree islands, slightly higher than the surrounding marshes. Composition and dominance vary depending on the community, but it is characterized by the combination of broad-leaved evergreen trees of tropical affinities, temperate broad-leaved deciduous trees, and the deciduous needle-leaved *Taxodium* spp. Species common to the different settings where the macrogroup occurs are *Annona glabra, Chrysobalanus icaco, Fraxinus caroliniana, Ilex cassine, Magnolia virginiana, Psychotria nervosa, Quercus laurifolia*, and *Sabal palmetto*. Composition of the Florida bayhead swamp is closest to the Cuban palm swamps because of the shared presence of *Conocarpus erectus* and the palm *Acoelorraphe wrightii*. Communities within this macrogroup are very gently sloping or depression forested wetlands usually saturated and occasionally inundated, often with peat accumulation on sand/marl/limestone substrate. In the case of Florida's "hydric hammocks," they are hardwood wetlands occupying flat lowlands with high water tables or ponded surface water, often underlain by limestone substrate and adjacent to coastal marshes. The most important natural controlling factors for vegetation of the macrogroup are climate and hydrology.

\*Diagnostic Characteristics: This macrogroup includes tree-dominated wetlands in the Caribbean. The physiognomy is a combination of broad-leaved evergreen trees of tropical affinities, including palms, temperate broad-leaved deciduous trees, and, in Florida, the deciduous needle-leaved *Taxodium* spp. may be present.

\*Classification Comments: Information for this macrogroup is best available from Florida, and further work is needed to characterize it across its range. In Florida, this macrogroup includes wet open woodlands and closed wetland forests of mostly subtropical broad-leaved evergreen trees. The physiognomy is diverse. The open woodlands or savannas dominated by *Taxodium ascendens* in south Florida are now placed in ~*Taxodium ascendens / Annona glabra / Rhynchospora* spp. Subtropical Swamp Forest Alliance (A4085)$$, ~Pond-cypress Basin Swamp Group (G036)$$, ~Pond-cypress Basin Swamp Macrogroup (M161)$$.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The physiognomy of these forested wetlands responds to the slightly different physical settings of the component communities. In Florida, bayhead swamps and hydric hammocks are both dominated by broad-leaved trees forming tree islands with a round or tear-drop shape. The canopy of hydric hammocks is dense, about 17-21 m high, and is dominated by one or more oak species, *Sabal palmetto*, or a combination of these. Palms are common, even dominant, in some stands. The understory is formed by young canopy trees, shrubs and abundant ferns (Vince et al. 1989). These forests are found on the highest sites, on peat, and remain wet 2-6 months per year (Richardson 2000).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Trees that may be present include *Annona glabra, Chrysobalanus icaco, Conocarpus erectus, Ficus aurea, Fraxinus caroliniana, Juniperus virginiana, Metopium toxiferum, Nyssa sylvatica, Persea borbonia, Persea palustris, Quercus laurifolia, Quercus nigra, Quercus virginiana, Roystonea elata, Sabal palmetto*, and *Taxodium* spp. These are a combination of broad-leaved evergreen trees of tropical affinities, temperate broad-leaved deciduous trees, and the deciduous needle-leaved *Taxodium* spp. In the broad-leaved evergreen forests, characteristic shrubs include *Cornus foemina, Diospyros virginiana, Morella cerifera (= Myrica cerifera), Myrsine cubana (= Myrsine floridana), Psychotria nervosa*, and *Salix caroliniana*. Herbaceous plants in the broad-leaved evergreen forests include *Acrostichum aureum, Acrostichum danaeifolium, Bacopa caroliniana, Crinum americanum, Nephrolepis exaltata*, and *Sagittaria graminea*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Information on the role of fire is best described for Florida's swamps. There, fire is not considered an important disturbance of the hydric hammock. However, the hammocks do burn occasionally. *Sabal palmetto* are fire-tolerant and intense fires favor this species. *Quercus virginiana* can survive low-intensity fires, but *Acer rubrum* is highly susceptible to fire. Flooding duration and frequency are primary factors in species composition. While most hydric hammock trees are at least somewhat adapted to flooding, the ranges of tolerance vary according to timing and depth of inundation (FNAI 1990). Increased salinity is a factor often limiting certain species. Although adult cypress trees are tolerant of extended inundation, their seeds cannot germinate under water and cypress seedlings may not survive if submerged (Vernon 1947, Kurz and Wagner 1953, cited in FNAI 2010a). The broad-leaved evergreen forests are generally not prone to fire except in extreme drought conditions (due to weather or hydrological alteration). The peat substrate can also burn under these forests. Severe fires reverse the succession sequence moving the forest communities back to wet prairies due to the elimination of the peat-based raised topography where the forest wetlands thrive (Richardson 2000).

ENVIRONMENT

Environmental Description: *Climate*: The climate is subtropical, with a dry season in the North American winter, and a rainy season in the North American summer. Average annual precipitation is 1325 to 1525 mm and 80% of the precipitation falls from mid-May to October. Average annual temperature ranges between 22-23°C; temperature drops below freezing only occasionally (FNAI 1990).

*Soil/substrate/hydrology*: The soils are generally peats (which may be deep) or muck, or limestone-influenced wet soils. The pH of soils varies from somewhat acidic to slightly alkaline with little organic matter. In areas underlain by limestone, depression swamps are often formed when poor surface drainage causes water to move downward and dissolve the limestone bedrock. These depressions then fill in with peat or marl (Duever et al. 1984). In the case of Florida's hydric hammocks, soil moisture is kept high mainly by rainfall accumulation on poorly drained soils and flooding lasts only for short periods after heavy rains (FNAI 1990). In general, rainfall, surface water, seepage, and ground water provide an abundance of water, and especially in the lowest lying natural wetlands, shallow water covers the surface during much of the rainy season.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs in Florida along the Gulf of Mexico from Aripeka to St. Marks, just landward of salt marsh. Smaller stands are scattered in the northern and central regions of peninsular Florida and in the south Florida Everglades and Big Cypress regions. Other known locations are in Cuba, Puerto Rico, and the Bahamas.

Nations: BS, CU, MQ, PR, TT, US

States/Provinces: FL

USFS Ecoregions (2007) [optional]: 411A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G002 | Caribbean Lowland Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-03-26 | M001 Caribbean & Central American Flooded & Swamp Forest Macrogroup | M001 split into M617 & M618 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Inland Swamps, Cypress and Bay Tree Forests | Davis 1943 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.H. Davis, Jr. (1943)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse and C.W. Nordman

Acknowledgments [optional]:

Version Date: 07 Oct 2015

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1. Forest & Woodland

1.A.4.Ed. Caribbean-Central American Flooded & Swamp Forest

M620. Mesoamerican Floodplain Forest

Type Concept Sentence: Existen varios tipos de bosques inundados estacionalmente en las planicies aluviales en climas que varían de muy húmedo a estacional y por lo tanto, la duración del periodo de inundación influye en la composición y estructura de las comunidades incluidas.

Several types of seasonally flooded forests located on alluvial plains in climates that vary from very humid to seasonal and therefore the length of the flooding period influences the composition and structure of the included communities.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ed. Caribbean-Central American Flooded & Swamp Forest (D093)

Elcode: M620

\*Scientific Name: Mesoamerican Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Mesoamerican Floodplain Forest Macrogroup

\*Colloquial Name: Mesoamerican Floodplain Forest

\*Type Concept: Este macrogrupo incluye varios tipos de bosques inundados estacionalmente en las planicies aluviales en climas que varían de muy húmedo a estacional y por lo tanto, la duración del periodo de inundación influye en la composición y estructura de las comunidades incluidas. Su distribución geográfica se extiende por el golfo de Urabá, en Colombia, hacia Panamá, Costa Rica, Nicaragua y Honduras, y los bosques en climas más fuertemente estacionales y de suelos calcáreos como los del Petén, en Belice y Guatemala. Van desde las comunidades forestales en suelos aluviales mal drenados a lo largo de las orillas de los principales ríos, donde la vegetación tiene las características de bosque pantanoso con grandes árboles con contrafuertes, árboles de subdosel con raíces aéreas y zancudas, algunas especies con neumatóforos y numerosas palmeras en el sotobosque. Algunas especies forman parches monodominantes. La siguiente lista de especies es diagnóstica para este macrogrupo: *Andira inermis, Chrysobalanus icaco, Copaifera aromatica, Copaifera panamensis, Crataeva tapia, Erythrina fusca, Erythrina lanceolata, Luehea seemannii, Pachira aquatica, Peltogyne purpurea, Prestoea decurrens, Prioria copaifera, Pterocarpus officinalis, Pterocarpus officinalis, Raphia taedigera, Swartzia panamensis, Symphonia globulifera, Tabebuia rosea, Triplaris americana, Virola koschnyi*. Species characteristic of the Peten alluvial seasonal flooded forests include *Acosmium panamense, Allophylus cominia, Orbignya cohune (= Attalea cohune), Bucida buceras, Bursera simaruba, Byrsonima bucidaefolia, Calophyllum antillanum (= Calophyllum brasiliense), Carapa guianensis, Castilla elastica, Coccoloba* spp., *Cupania belicensis, Dendropanax arboreus, Dialium guianense, Diospyros cuneata, Ficus* spp., *Guettarda combsii, Haematoxylum campechianum, Licaria packii, Lysiloma latisiliquum (= Lysiloma bahamense), Matayba apetala (= Matayba oppositifolia), Poulsenia armata, Pouteria* spp., *Pterocarpus rohrii, Simarouba glauca, Simira salvadorensis, Swietenia macrophylla, Symphonia globulifera, Terminalia amazonia, Vitex gaumeri*.

This macrogroup includes several types of seasonally flooded forests located on alluvial plains in climates that vary from very humid to seasonal and therefore the length of the flooding period influences the composition and structure of the communities included. Their geographic range spans the Gulf of Uraba in Colombia, Panama, Costa Rica, Nicaragua and Honduras, and forests in more strongly seasonal climates and on calcareous soils like those of the Peten in Belize and Guatemala. They include forest communities on poorly drained alluvial soils along the banks of major rivers, where the vegetation has the characteristics of swamp forest with large trees with buttresses, subcanopy trees with stilt roots and numerous palms in the understory, and some species with pneumatophores. Some species form monodominant stands. The above list of species is diagnostic for this macrogroup.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Sobre la base de la longitud del período hídrico, los bosques inundados se pueden agrupar en bosques pantanosos inundados permanentemente o inundados periódicamente. Bosques pantanosos se encuentran generalmente en suelos que tienen alto nivel freático, por ejemplo, pantanos de *Mauritia flexuosa* (palma) en Trinidad crecen en tierra perpetuamente inundada con 30 a 100 cm de agua; mientras pantanos periódicamente inundados - se producen en áreas sujetas a inundaciones durante la temporada de lluvias. La riqueza de especies en general, disminuye con el aumento hídrico. Con base en el tipo de especies dominantes, los bosques pantanosos pueden ser convenientemente divididos en dos tipos: bosques dominados por especies de madera dura y los dominados por palmas. Dominancia de palmeras se hace más marcada con la duración del hidroperíodo o las condiciones del suelo de mayor humedad (Bacon 1990, Lugo et al. 1990).

Based on the length of the hydroperiod, flooded forests can be grouped into permanently inundated swamp forest and periodically inundated swamp forest. Swamp forest is usually found on soils that have high water table, e.g., *Mauritia flexuosa* (palm) swamp in Trinidad grows on land perpetually inundated with 30 to 100 cm of water; while periodically-inundated swamp occurs in areas subjected to inundation during rainy season. Species richness generally decreases with increasing hydroperiod. Based on the type of dominant species, swamp forests can be conveniently divided into two types: forests dominated by hardwood species and those dominated by palms. Dominance by palms becomes stronger with increasing hydroperiod or soil moisture conditions (Bacon 1990, Lugo et al. 1990).

ENVIRONMENT

Environmental Description: Los bosques inundados se pueden agrupar en los tipos fluvial, marginal y de depresiones. El bosque ribereño o fluvial inundado depende de las inundaciones estacionales de los ríos como la várzea o Igapó. Los bosques inundados marginales crecen en las costas oceánicas y lacustres, donde los flujos de agua son bidireccionales, por ejemplo, bosques inundados por las mareas, o el bosque de pantano de marea de agua dulce. El bosque inundado de depresiones se encuentra donde se acumula el agua y puede fluctuar en profundidad dependiendo del equilibrio de escorrentía de la lluvia y la evapotranspiración, por ejemplo, aguajales en la Amazonía (Lugo 1990).

Flooded forests can be grouped into riverine, fringe and basin types. Riverine flooded forest depends on seasonal river floods such as várzea or ígapo. Fringe flooded forest grows on oceanic and lake shorelines where water flows are bidirectional, e.g., tidally flooded forest, or freshwater tidal swamp forest. Basin flooded forest is found in depressions where water accumulates and may fluctuate in depth depending on the balance of rainfall runoff and evapotranspiration, e.g., aguajal (Lugo 1990).

DISTRIBUTION

\*Geographic Range: Their geographic range of this macrogroup spans the Gulf of Uraba in Colombia, Panama, Costa Rica, Nicaragua and Honduras, and forests in more strongly seasonal climates and on calcareous soils like those of the Peten in Belize and Guatemala.

Nations: BZ, CO, CR, GT, HN, MX, NI, PA, SV

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

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1. Forest & Woodland

1.A.4.Ed. Caribbean-Central American Flooded & Swamp Forest

M619. Mesoamerican Coastal Plain Swamp Forest

Type Concept Sentence: Bosques pantanosos (sin manglares) de estuario cuyo régimen de inundación está influenciado por las mareas oceánicas. Geográficamente se extienden desde el norte de Ecuador a ambas costas de América Central, donde los ríos son lo suficientemente grandes para formar estuarios considerables.

Non-mangrove estuarine swamp forests whose flooding regime is influenced by ocean tides. Geographically they span from northern Ecuador to both coasts of Central America, where rivers are large enough to form sizable estuaries.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ed. Caribbean-Central American Flooded & Swamp Forest (D093)

Elcode: M619

\*Scientific Name: Mesoamerican Coastal Plain Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Mesoamerican Coastal Plain Swamp Forest Macrogroup

\*Colloquial Name: Mesoamerican Coastal Plain Swamp Forest

\*Type Concept: Este macrogrupo representa los bosques pantanosos de estuario (no manglares) cuyo régimen de inundación está influenciado por las mareas oceánicas. Geográficamente se extienden desde el norte de Ecuador a ambas costas de América Central, donde los ríos son lo suficientemente grandes para formar estuarios considerables. Se incluyen dos tipos de pantanos: los más cerca del mar y por lo tanto con mayor salinidad y dinámica de las mareas, y los del interior en el delta, que todavía están influenciados por la salinidad y movimientos de las mareas. Los primeros están cerca de la costa del mar o asociados con las lagunas costeras y permanecen inundados la mayor parte del año, sólo se producen desde el noroeste de Colombia hasta Nicaragua. Tienen 10 a 15 m de altura y por lo general están dominados por la palma *Raphia taedigera* ("yolillo"); otros elementos comunes son *Symphonia globulifera, Calophyllum antillanum (= Calophyllum brasiliense), Scheelea rostrata, Pterocarpus officinalis, Carapa nicaraguensis, Erythrina* sp., *Acoelorraphe wrightii, Manicaria saccifera, Xilopia* spp., *Isertia hankeana, Alibertia edulis, Psychotria aubletiana*. El otro tipo que se encuentra más hacia el interior, también se inunda periódicamente por agua salobre pero cada vez menos salina y es más diverso. La siguiente lista de especies es diagnóstica para el Atlántico del Istmo y Chocó-Darien: *Camnosperma panamensis* (orey, sajales), *Raphia taedigera* (yolillo, matomba), *Euterpe precatoria, Carapa guianensis, Dialyanthera gordoniifolia* (guandales), *Symphonia globulifera, Grias fendleri, Sacoglottis trichogyna, Conocarpus erectus, Cassipourea* sp., *Calophyllum antillanum*. Peten and CA Atlantic: *Manicaria saccifera* (manacal), *Roystonea dunlapiana, Roystonea regia, Acoelorraphe wrightii* (tique), *Astrocaryum mexicanum, Astrocaryum alatum, Dialium guianense, Symphonia globulifera, Orbignya cohune (= Attalea cohune), Pentaclethra macroloba, Sabal mauritiiformis, Bactris* spp., *Euterpe aff. oleracea, Crysophila stauracantha*.

This macrogroup represents the non-mangrove estuarine swamp forests whose flooding regime is influenced by ocean tides. Geographically they span from northern Ecuador to both coasts of Central America, where rivers are large enough to form sizable estuaries. Two types of swamps are included: those closer to the ocean and therefore with higher salinity and tidal dynamics, and those further inland in the delta, which still are influenced by salinity and tidal movements. The former are near the sea coast or associated with coastal lagoons and remain flooded most of the year, only occurring from northwestern Colombia up to Nicaragua. They are 10-15 m high and usually are dominated by the palm *Raphia taedigera* ("yolillo"); other common elements are *Symphonia globulifera, Calophyllum antillanum, Scheelea rostrata, Pterocarpus officinalis, Carapa nicaraguensis, Erythrina* sp., *Acoelorraphe wrightii, Manicaria saccifera, Xilopia* spp., *Isertia hankeana, Alibertia edulis, Psychotria aubletiana*. The other type found further inland in the delta is periodically inundated by brackish but less saline water and is more diverse. The above list of species is diagnostic for the Isthmian Atlantic and Choco-Darien.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Sobre la base de la longitud del período hídrico, los bosques inundados se pueden agrupar en bosques pantanosos inundados permanentemente e inundados periódicamente. Bosques pantanosos se encuentran generalmente en suelos que tienen alto nivel freático, por ejemplo, el pantano de *Mauritia flexuosa* (palma) en Trinidad crece en tierra perpetuamente inundada con 30 a 100 cm de agua; mientras pantanos periódicamente inundados - se producen en áreas sujetas a inundaciones durante la temporada de lluvias. La riqueza de especies en general, disminuye con el aumento hídrico. Con base en el tipo de especies dominantes, los bosques pantanosos pueden ser convenientemente divididos en dos tipos: bosques dominados por especies de madera dura y los dominados por palmas. La dominancia de palmeras se hace más marcada con un hidroperíodo mas largo o debido a condiciones del suelo de mayor humedad (Bacon 1990, Lugo et al. 1990).

Based on the length of the hydroperiod, flooded forests can be grouped into permanently inundated swamp forest and periodically inundated swamp forest. Swamp forest is usually found on soils that have high water table, e.g., *Mauritia flexuosa* (palm) swamp in Trinidad grows on land perpetually inundated with 30 to 100 cm of water; while periodically-inundated swamp occurs in areas subjected to inundation during rainy season. Species richness generally decreases with increasing hydroperiod. Based on the type of dominant species, swamp forests can be conveniently divided into two types: forests dominated by hardwood species and those dominated by palms. Dominance by palms becomes stronger with increasing hydroperiod or soil moisture conditions (Bacon 1990, Lugo et al. 1990).

ENVIRONMENT

Environmental Description: Los bosques inundados se pueden agrupar en los tipos fluvial, marginal y de depresiones. El bosque ribereño o fluvial inundado depende de las inundaciones estacionales de los ríos como la várzea o Igapó. Los bosques inundados marginales crecen en las costas oceánicas y lacustres, donde los flujos de agua son bidireccionales, por ejemplo, bosques inundados por las mareas, o el bosque de pantano de marea de agua dulce. El bosque inundado de depresiones se encuentra donde se acumula el agua y puede fluctuar en profundidad dependiendo del equilibrio de escorrentía de la lluvia y la evapotranspiración, por ejemplo, aguajales en la Amazonía (Lugo 1990).

Flooded forests can be grouped into riverine, fringe and basin types. Riverine flooded forest depends on seasonal river floods such as várzea or ígapo. Fringe flooded forest grows on oceanic and lake shorelines where waterflows are bidirectional, e.g., tidally flooded forest, or freshwater tidal swamp forest. Basin flooded forest is found in depressions where water accumulates and may fluctuate in depth depending on the balance of rainfall runoff and evapotranspiration, e.g., aguajal (Lugo 1990).

DISTRIBUTION

\*Geographic Range: Northern Ecuador to both coasts of Central America, where rivers are large enough to form sizable estuaries.

Nations: BZ, CO, CR, EC, GT, HN, NI, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
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RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

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1. Forest & Woodland

1.A.4.Ei. Colombian-Venezuelan Flooded & Swamp Forest

D233. Colombian-Venezuelan Flooded & Swamp Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.4.Ei. Tropical Flooded & Swamp Forest (F029)

Elcode: D233

\*Scientific Name: Colombian-Venezuelan Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Colombian-Venezuelan Flooded & Swamp Forest Division

\*Colloquial Name: Colombian-Venezuelan Flooded & Swamp Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, CR, EC, PA, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M622 | Choco-Darien Floodplain Forest |
| M621 | Guajiran Flooded Forest |
| M625 | Guayaquil Flooded & Swamp Forest |
| M624 | Llanos Flooded & Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ei. Colombian-Venezuelan Flooded & Swamp Forest

M622. Choco-Darien Floodplain Forest

Type Concept Sentence: Los bosques inundables dominados por palmeras, muy comunes en la región del Chocó-Darién-hiper húmedo, pero se extiende a Costa Rica en la costa del Pacífico.

These floodplain forests are dominated by palms, and are very common in the hyper-humid Chocó-Darién region, but extending to Costa Rica on the Pacific Coast.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ei. Colombian-Venezuelan Flooded & Swamp Forest (D233)

Elcode: M622

\*Scientific Name: Choco-Darien Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Choco-Darien Floodplain Forest Macrogroup

\*Colloquial Name: Choco-Darien Floodplain Forest

\*Type Concept: Los bosques inundables dominados por palmeras, muy comunes en la región del Chocó-Darién-hiper húmedo, pero se extiende a Costa Rica en la costa del Pacífico. Los suelos están inundados o saturados estacionalmente, durante períodos de tiempo largos en el caso del Chocó. La siguiente lista de especies es diagnóstica para este macrogrupo: *Mauritiella pacifica, Oenocarpus bataua, Cedrela angustifolia, Euterpe oleracea, Euterpe cuatrecasana, Manicaria saccifera, Raphia taedigera, Jessenia* spp., *Attalea* spp.

These floodplain forests are dominated by palms, and are very common in the hyper-humid Chocó-Darién region, but extending to Costa Rica on the Pacific Coast. The soils are seasonally inundated or saturated, over long time periods in the case of the Chocó. The following list of species is diagnostic for this macrogroup: *Mauritiella pacifica, Oenocarpus bataua, Cedrela angustifolia, Euterpe oleracea, Euterpe cuatrecasana, Manicaria saccifera, Raphia taedigera, Jessenia* spp., *Attalea* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
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Dynamics: Sobre la base de la longitud del período hídrico, los bosques inundados se pueden agrupar en bosques pantanosos inundados permanentemente y los inundados periódicamente. Bosques pantanosos se encuentran generalmente en suelos que tienen alto nivel freático, por ejemplo, pantano de *Mauritia flexuosa* (palma) en Trinidad crece en tierra perpetuamente inundada con 30 a 100 cm de agua; mientras pantanos periódicamente inundados - se producen en áreas sujetas a inundaciones durante la temporada de lluvias. La riqueza de especies en general, disminuye con el aumento hídrico. Con base en el tipo de especies dominantes, bosques pantanosos pueden ser convenientemente divididos en dos tipos: bosques dominados por especies de madera dura y los dominados por palmas. Dominancia de palmeras se hace más fuerte con hidroperíodos prolongados o las condiciones del suelo de mayor humedad (Bacon 1990, Lugo et al. 1990).

Based on the length of the hydroperiod, flooded forests can be grouped into permanently inundated swamp forest and periodically inundated swamp forest. Swamp forest is usually found on soils that have high water table, e.g., *Mauritia flexuosa* (palm) swamp in Trinidad grows on land perpetually inundated with 30 to 100 cm of water; while periodically-inundated swamp occurs in areas subjected to inundation during rainy season. Species richness generally decreases with increasing hydroperiod. Based on the type of dominant species, swamp forests can be conveniently divided into two types: forests dominated by hardwood species and those dominated by palms. Dominance by palms becomes stronger with increasing hydroperiod or soil moisture conditions (Bacon 1990, Lugo et al. 1990).

ENVIRONMENT

Environmental Description: Los bosques inundados se pueden agrupar en los tipos fluvial, marginal y de depresiones. El bosque ribereño o fluvial inundado depende de las inundaciones estacionales de los ríos como la várzea o Igapó. Los bosques inundados marginales crecen en las costas oceánicas y lacustres, donde los flujos de agua son bidireccionales, por ejemplo, bosques inundados por las mareas, o el bosque de pantano de marea de agua dulce. El bosque inundado de depresiones se encuentra donde se acumula el agua y puede fluctuar en profundidad dependiendo del equilibrio de escorrentía de la lluvia y la evapotranspiración, por ejemplo, aguajales en la Amazonía (Lugo 1990).

Flooded forests can be grouped into riverine, fringe and basin types. Riverine flooded forest depends on seasonal river floods such as várzea or ígapo. Fringe flooded forest grows on oceanic and lake shorelines where water flows are bidirectional, e.g., tidally flooded forest, or freshwater tidal swamp forest. Basin flooded forest is found in depressions where water accumulates and may fluctuate in depth depending on the balance of rainfall runoff and evapotranspiration, e.g., aguajal (Lugo 1990).

DISTRIBUTION

\*Geographic Range:

Nations: CO, CR, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

Bacon, P. R. 1990. Ecology and management of swamp forests in the Guianas and Caribbean region. Pages 213-250 in: A. E. Lugo, M. Brinson, and S. Brown, editors. Ecosystems of the World 15. Forested wetlands. Elsevier Scientific Publishing Company, New York.

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Lugo, A. E. 1990. Introduction. Pages 1-14 in: A. E. Lugo, M. Brinson, and S. Brown, editors. Ecosystems of the World 15. Forested wetlands. Elsevier Scientific Publishing Company, New York.

Lugo, A. E., S. Brown, and M. M. Brinson 1990. Synthesis and search for paradigms in wetland ecology. Pages 447-460 in: A. E. Lugo, M. Brinson, and S. Brown, editors. Ecosystems of the World 15. Forested wetlands. Elsevier Scientific Publishing Company, New York.

1. Forest & Woodland

1.A.4.Ei. Colombian-Venezuelan Flooded & Swamp Forest

M621. Guajiran Flooded Forest

Type Concept Sentence: Riverine forests of the humid but seasonal Caribbean coast and adjacent inland areas of Colombia and Venezuela. Characteristic species include *Anacardium excelsum, Aspidosperma dugandii, Astronium graveolens, Attalea butyraceae, Bombacopsis pinnata, Brosimum alicastrum, Ceiba pentandra, Cochlospermum vitifolium, Gustavia speciosa, Hura crepitans, Licania apetala, Machaerium arboreum, Ochroma pyramidale, Samanea saman, Spondias mombin, Tabebuia ochracea*, and *Vitex cymosa*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ei. Colombian-Venezuelan Flooded & Swamp Forest (D233)

Elcode: M621

\*Scientific Name: Guajiran Flooded Forest Macrogroup

\*Common (Translated Scientific) Name: Guajiran Flooded Forest Macrogroup

\*Colloquial Name: Guajiran Flooded Forest

\*Type Concept: Riverine forests along rivers and creeks of the humid but seasonal Caribbean coast and hinterlands of Colombia and Venezuela. The following list of species is diagnostic for this macrogroup: *Anacardium excelsum, Attalea butyraceae, Hura crepitans, Astronium graveolens, Ceiba pentandra, Spondias mombin, Gustavia speciosa, Bombacopsis pinnata, Aspidosperma dugandii, Machaerium arboreum, Cochlospermum vitifolium, Ochroma pyramidale (= Ochroma lagopus), Brosimum alicastrum, Licania apetala, Samanea saman, Tabebuia ochracea*, and *Vitex cymosa*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M623 Magdalena Flooded & Swamp Forest Macrogroup | M623 concept covered by M621 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ei. Colombian-Venezuelan Flooded & Swamp Forest

M625. Guayaquil Flooded & Swamp Forest

Type Concept Sentence: Diverse forests of the banks and floodplains of whitewater rivers of central and southwestern Ecuador, with seasonal precipitation, but varying annual totals, from humid to dry climates. Their extension is limited to small linear patches.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ei. Colombian-Venezuelan Flooded & Swamp Forest (D233)

Elcode: M625

\*Scientific Name: Guayaquil Flooded & Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Guayaquil Flooded & Swamp Forest Macrogroup

\*Colloquial Name: Guayaquil Flooded & Swamp Forest

\*Type Concept: Diverse forests of the banks and floodplains of whitewater rivers of central and southwestern Ecuador. Precipitation is seasonal with varying annual totals that result in a range from humid to dry climates. Their extension is limited to small linear patches.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
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\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ei. Colombian-Venezuelan Flooded & Swamp Forest

M624. Llanos Flooded & Swamp Forest

Type Concept Sentence: Three types of flooded forests of the Orinoquian Llanos in Colombia and Venezuela: (1) those saturated almost permanently from seasonal flow or seepage of black or clear waters and mostly occurring in lower terrain of the eastern portion of the Llanos in Colombia and Venezuela; (2) "varzea" forests along the floodplains of the Orinoco River, flooded for up to six months/year and alternating with marshes and flooded savannas; and (3) seasonal deciduous forests inundated for a shorter period of time and occurring along the floodplains of the Llanos de Apure in Venezuela and the Meta River in Colombia.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ei. Colombian-Venezuelan Flooded & Swamp Forest (D233)

Elcode: M624

\*Scientific Name: Llanos Flooded & Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Llanos Flooded & Swamp Forest Macrogroup

\*Colloquial Name: Llanos Flooded & Swamp Forest

\*Type Concept: This macrogroup represents three types of flooded forests of the Orinoquian Llanos in Colombia and Venezuela. The first are those inundated or saturated almost permanently from seasonal flow or seepage of blackwater or clearwater and mostly occurring in the lower terrain towards the eastern part of the Llanos in Colombia and Venezuela, with characteristic species such as *Protium calanense, Pseudolmedia laevigata, Manilkara bidentata, Socratea durissima, Scheleea, Jessenia, Geonoma, Bactris, Nectandra, Alchornea, Inga, Jacaranda, Amanoa guianensis, Bactris* sp., *Euterpe oleracea, Geonoma maxima, Calophyllum lucidum, Coccoloba* sp., *Mabea nitida, Protium heptaphyllum, Symphonia globulifera, Sapium salicifolium, Virola surinamensis*. The second type included is the "varzea" forests along the floodplains of the Orinoco River, flooded for up to six months/year and alternating with marshes and flooded savannas. Characteristic species of the Orinoco varzea forests are *Combretum frangulifolium, Gustavia augusta, Etaballia dubia, Albizia corymbosa, Spondias mombin, Mabea nitida, Homalium racemosum, Symmeria paniculata, Copaifera pubiflora, Campsiandra laurifolia, Eschweilera tenuifolia, Astrocaryum aculeatum, Acosmium nitens, Caraipa llanorum, Sorghastrum setosum (= Sorghastrum parviflorum), Hymenachne amplexicaulis, Eleocharis filiculmis*. The third type represents the seasonal deciduous gallery forests inundated for a shorter period of time that occur along the floodplains of the Llanos de Apure in Venezuela, and those that flow into the Meta River in Colombia. In this type, common deciduous species include *Cordia collococa, Sapindus saponaria, Astronium graveolens, Hura crepitans, Coccoloba caracasana, Pradosia caracasana, Guazuma ulmifolia, Macrolobium* sp., *Tabebuia rosea, Stemmadenia* sp., *Calophyllum lucidum, Xylopia emarginata, Protium crassipetalum, Socratea elegans, Vochysia ferruginea, Lacistema aggregatum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ej. Guianan Flooded & Swamp Forest

D234. Guianan Flooded & Swamp Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.4.Ej. Tropical Flooded & Swamp Forest (F029)

Elcode: D234

\*Scientific Name: Guianan Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Guianan Flooded & Swamp Forest Division

\*Colloquial Name: Guianan Flooded & Swamp Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO, GF, GY, SV, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M626 | Guianan Riparian Forest |
| M627 | Guianan Swamp Forest |
| M628 | Orinoco Delta Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ej. Guianan Flooded & Swamp Forest

M626. Guianan Riparian Forest

Type Concept Sentence: Periodically flooded, humid riparian forests of the floodplains of the southern Orinoco and the clearwater tributaries south of the Orinoco in Colombia, Brazil and Venezuela, including the riparian forests of the Guiana Shield. Plant communities vary from slightly open, semi-deciduous, forests 15-20 m tall to dense forests up to 30 m tall. Characteristic species include *Albizia corymbosa, Astrocaryum aculeatum, Campsiandra laurifolia, Combretum frangulifolium, Copaifera pubiflora, Eschweilera tenuifolia, Etaballia dubia, Gustavia augusta, Homalium racemosum, Homalium racemosum, Mabea nitida, Piranhea trifoliata, Sclerolobium guianense*, and *Symmeria paniculata*. In some situations, especially those with low-nutrient soils, terrestrial ferns and forbs are abundant.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ej. Guianan Flooded & Swamp Forest (D234)

Elcode: M626

\*Scientific Name: Guianan Riparian Forest Macrogroup

\*Common (Translated Scientific) Name: Guianan Riparian Forest Macrogroup

\*Colloquial Name: Guianan Riparian Forest

\*Type Concept: This macrogroup represents the periodically flooded riparian forests of the humid, southern Orinoco floodplains and those of the clearwater rivers that drain to it from the south in Colombia, Brazil and Venezuela, including the riparian forests of the Guiana Shield. The communities vary from slightly open, semi-deciduous forests 15-20 m high to dense forests up to 30 m tall. Characteristic species are *Piranhea trifoliata, Homalium racemosum, Sclerolobium guianense, Combretum frangulifolium, Gustavia augusta, Etaballia dubia, Albizia corymbosa, Spondias mombin, Mabea nitida, Homalium racemosum, Symmeria paniculata, Copaifera pubiflora, Campsiandra laurifolia, Eschweilera tenuifolia, Astrocaryum aculeatum*. In some situations, especially with low-nutrient soils, there are abundant terrestrial ferns and forbs (*Heliconia* sp., *Phenacospermum guyanense*) and woody elements such as *Calophyllum antillanum (= Calophyllum brasiliense), Oenocarpus bataua, Xylopia emarginata, Vochysea ferruginea, Couma macrocarpa, Parkia pendula, Clathrotropis macrocarpa, Licania* sp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO, GY, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ej. Guianan Flooded & Swamp Forest

M627. Guianan Swamp Forest

Type Concept Sentence: Seasonally inundated swamp and riverine forests of the interior lowlands of Guyana, Surinam, French Guiana and extreme northeastern Amapa state in Brazil, including the Pakaraima and Kanuku regions of the southeastern Guiana Shield. These are forests of riverbanks and narrow floodplains, growing on peat substrate formed on top of white sands, which in turn lay on a clayish hardpan. These forests are often dominated by palms and other communities depending on the duration of the flooding and the type of substrate. Characteristic species are *Anacardium giganteum, Carapa guianensis, Eschweilera pedicellata, Goupia glabra*, and *Mora excelsa*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ej. Guianan Flooded & Swamp Forest (D234)

Elcode: M627

\*Scientific Name: Guianan Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Guianan Swamp Forest Macrogroup

\*Colloquial Name: Guianan Swamp Forest

\*Type Concept: The macrogroup includes seasonally inundated swamp and riverine forests of the interior lowlands and hills of Guyana, Surinam, French Guiana and extreme northeastern Amapa state in Brazil, including those of the hilly region of Pakaraima and Kanuku in the southeast of the Guiana Shield. These are forests of the riverbanks and narrow floodplains growing on peat substrate formed on top of white sands which in turn lay on a clayish hardpan. These forests are often dominated by palms and various other communities depending on the duration of the flooding and the type of substrate. Diagnostic species are *Mora excelsa, Eschweilera pedicellata, Rauia* sp., *Anacardium giganteum, Cedrela odorata, Carapa guianensis, Aniba* sp., *Goupia glabra, Manilkara* spp., *Sagotia* sp., *Rinorea pubiflora, Macrolobium acaciifolium, Dimorphandra congestiflora, Solanum subinerme, Inga cf. meissneriana, Tabernaemontana tetrastachya, Triplaris weigeltiana, Psidium* sp., *Cecropia schreberiana (= Cecropia peltata), Astrocaryum vulgare, Ceiba pentandra, Jacaranda obtusifolia, Toulicia pulvinata, Martiodendron excelsum, Elizabetha coccinea, Croton cuneatus, Inga nobilis, Inga ingoides, Macrolobium bifolium, Pithecellobium corymbosum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO, GF, GY, SR, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ej. Guianan Flooded & Swamp Forest

M628. Orinoco Delta Swamp Forest

Type Concept Sentence: Swamp forests located along the shorelines of the middle and lower Orinoco Delta, or along riverbanks in the coastal plain of Guyana, French Guiana and Surinam. They grow on alluvial sedimentary, sandy-clayish substrates developed on recent marine deposits and sometimes on a peat layer. They are a complex of brackish swamps and flooded riparian forests with an abundance of palms, 10 to 25 m high. Usually with a strip of herbaceous marshes along the shore due to the flooding dynamics. Diagnostic species are *Caryocar microcarpum, Euterpe oleracea, Mauritia flexuosa, Pterocarpus officinalis, Symphonia globulifera*, and *Virola surinamensis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ej. Guianan Flooded & Swamp Forest (D234)

Elcode: M628

\*Scientific Name: Orinoco Delta Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Orinoco Delta Swamp Forest Macrogroup

\*Colloquial Name: Orinoco Delta Swamp Forest

\*Type Concept: The swamp forests included in this macrogroup are those located along the shorelines of the middle and low Orinoco Delta or along riverbanks in the coastal plain of Guyana, French Guiana and Surinam. They grow on alluvial sedimentary sandy-clayish substrates developed on recent marine deposits and sometimes on a peat layer. They are a complex of brackish swamps and flooded riparian forests with an abundance of palms, 10 to 25 m high, usually with a strip of herbaceous marshes along the shore due to the flooding dynamics. Diagnostic species are *Annona glabra, Triplaris surinamensis, Andira inermis, Erythrina fusca (= Erythrina glauca), Pterocarpus officinalis, Virola surinamensis, Euterpe oleracea, Carapa guianensis, Caryocar microcarpum, Mauritia flexuosa, Symphonia globulifera, Bonafousia tetrastachya, Rheedia kappleri, Tovomita* sp., *Sloanea grandiflora, Manicaria saccifera, Iryanthera macrophylla, Tabebuia fluviatilis, Mora excelsa, Pachira aquatica*, and *Bactris* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: GF, GY, SR, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ek. Tropical Andean Riparian & Flooded Forest

D235. Tropical Andean Riparian & Flooded Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.4.Ek. Tropical Flooded & Swamp Forest (F029)

Elcode: D235

\*Scientific Name: Tropical Andean Riparian & Flooded Forest Division

\*Common (Translated Scientific) Name: Tropical Andean Riparian & Flooded Forest Division

\*Colloquial Name: Tropical Andean Riparian & Flooded Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M631 | Bolivian-Tucuman Dry Valley Riparian Forest |
| M632 | Eastern Subandean Ridge Flooded Forest |
| M630 | Central Andean Riparian Forest |
| M629 | Northern Andean Riparian Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ek. Tropical Andean Riparian & Flooded Forest

M631. Bolivian-Tucuman Dry Valley Riparian Forest

Type Concept Sentence: Riparian forests of humid to subhumid Andean forests in southeastern Bolivia and northwestern Argentina. They develop on river terraces, distal alluvial fans of the foothills of intermontane valleys, and on relatively narrow floodplains of torrential mountain streams. Characteristic species are *Coccoloba tiliacea, Kaunia saltensis, Myroxylon peruiferum, Pentapanax angelicifolius, Piptadenia boliviana*, and *Pisonia ambigua*. Other characteristic species of lower elevations include *Acacia visco, Acalypha plicata, Clematis montevidensis, Muehlenbeckia tamnifolia, Pisoniella arborescens, Salix humboldtiana, Sapium glandulosum, Sapium haematospermum*, and *Schinus molle*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ek. Tropical Andean Riparian & Flooded Forest (D235)

Elcode: M631

\*Scientific Name: Bolivian-Tucuman Dry Valley Riparian Forest Macrogroup

\*Common (Translated Scientific) Name: Bolivian-Tucuman Dry Valley Riparian Forest Macrogroup

\*Colloquial Name: Bolivian-Tucuman Dry Valley Riparian Forest

\*Type Concept: This macrogroup represents the riparian forests of the humid to subhumid Andean forests in southeastern Bolivia and northwestern Argentina. They develop on the river terraces, distal alluvial fans of the foothills of intermontane valleys and on relative narrow floodplains of typically torrential mountain streams. Characteristic species are *Pisonia ambigua, Myroxylon peruiferum, Coccoloba tiliacea, Kaunia saltensis, Piptadenia boliviana, Pentapanax angelicifolius*, and in the lower elevations are *Salix humboldtiana, Sapium glandulosum, Sapium haematospermum, Schinus molle, Acacia visco, Acalypha plicata, Pisoniella arborescens, Muehlenbeckia tamnifolia*, and *Clematis montevidensis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ek. Tropical Andean Riparian & Flooded Forest

M632. Eastern Subandean Ridge Flooded Forest

Type Concept Sentence: Amazonian floodplain forest occurring at elevations slightly above 1000 m elevation in the Cordillera Azul of the subandean region in Peru. These forests occur in elevated wide valleys and support communities of the palm *Mauritia flexuosa* with *Symphonia* sp., *Ficus* spp., and marsh forbs.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ek. Tropical Andean Riparian & Flooded Forest (D235)

Elcode: M632

\*Scientific Name: Eastern Subandean Ridge Flooded Forest Macrogroup

\*Common (Translated Scientific) Name: Eastern Subandean Ridge Flooded Forest Macrogroup

\*Colloquial Name: Eastern Subandean Ridge Flooded Forest

\*Type Concept: This macrogroup is composed of only one known type of Amazonian floodplain forest occurring at elevations slightly above 1000 m in the Cordillera Azul of the sub-Andean region in Peru, in elevated wide valleys. It supports communities of the palm *Mauritia flexuosa* with *Symphonia* sp., *Ficus* spp., and marsh forbs.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ek. Tropical Andean Riparian & Flooded Forest

M630. Central Andean Riparian Forest

Type Concept Sentence: Diverse riparian vegetation communities distributed across the central Andes in Peru, Bolivia, and Argentina. Includes very humid forests on alluvial soils dominated by deciduous *Alnus acuminata*, with *Clusia trochitae, Dryopteris* spp., *Escallonia herrerae, Hedyosmum angustifolium, Hedyosmum dombeyanum, Myrica pubescens, Polystichum* spp., *Symplocos quitensis*, and *Vallea stipularis*, and species of *Cortaderia* closer to the water. Also includes riparian communities along depositional stream margins in the xeric pre-Puna, where dominant species include *Acacia visco, Baccharis juncea, Baccharis salicifolia, Nicotiana glauca, Pluchea absynthioides*, and *Salix humboldtiana*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ek. Tropical Andean Riparian & Flooded Forest (D235)

Elcode: M630

\*Scientific Name: Central Andean Riparian Forest Macrogroup

\*Common (Translated Scientific) Name: Central Andean Riparian Forest Macrogroup

\*Colloquial Name: Central Andean Riparian Forest

\*Type Concept: This macrogroup includes communities of varied riparian vegetation distributed across the geography of the central Andes from Peru, Bolivia and Argentina, including very humid forests on alluvial soils dominated by deciduous *Alnus acuminata*, with *Vallea stipularis, Myrica pubescens, Clusia trochitae, Escallonia herrerae, Hedyosmum angustifolium, Hedyosmum dombeyanum, Symplocos quitensis, Polystichum, Dryopteris*, and species of *Cortaderia* closer to the water. Also included are the riparian communities along depositional stream margins in the xeric pre-Puna, where dominant species include *Salix humboldtiana, Acacia visco, Baccharis salicifolia, Baccharis juncea, Pluchea absynthioides*, and *Nicotiana glauca*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Ek. Tropical Andean Riparian & Flooded Forest

M629. Northern Andean Riparian Forest

Type Concept Sentence: Semi-open forests, occurring in a narrow strip along the margins of streams within Andean humid montane forests in Venezuela, Colombia and Ecuador. At higher elevations these forests are dominated by *Alnus acuminata, Vallea ecuadoriensis*, and *Vallea stipularis*, with abundant ferns, forbs and grasses in the understory. At lower elevations and in more open settings in valley bottoms, characteristic species include *Salix humboldtiana* and *Tessaria integrifolia*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Ek. Tropical Andean Riparian & Flooded Forest (D235)

Elcode: M629

\*Scientific Name: Northern Andean Riparian Forest Macrogroup

\*Common (Translated Scientific) Name: Northern Andean Riparian Forest Macrogroup

\*Colloquial Name: Northern Andean Riparian Forest

\*Type Concept: Semi-open forests occurring on a narrow strip along the margins of streams within Andean humid montane forests in Venezuela, Colombia and Ecuador. At higher elevations these are dominated by *Alnus acuminata, Vallea ecuadoriensis, Vallea stipularis*, and abundant ferns, forbs and grasses in the understory. At lower elevations and in more open settings of the valley bottoms, characteristic species are *Salix humboldtiana* and *Tessaria integrifolia*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.El. Amazonian Flooded & Swamp Forest

D236. Amazonian Flooded & Swamp Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.4.El. Tropical Flooded & Swamp Forest (F029)

Elcode: D236

\*Scientific Name: Amazonian Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Amazonian Flooded & Swamp Forest Division

\*Colloquial Name: Amazonian Flooded & Swamp Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M640 | Amazon Delta Swamp Forest |
| M638 | Central Amazon Floodplain Forest |
| M637 | Northern Amazon Floodplain Forest |
| M639 | South-Central Amazon Floodplain Forest |
| M636 | Southern Amazon Swamp Forest |
| M635 | Southwestern Amazon Floodplain Forest |
| M633 | Western Amazon Floodplain Forest |
| M634 | Western Amazon Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.El. Amazonian Flooded & Swamp Forest

M640. Amazon Delta Swamp Forest

Type Concept Sentence: Swamp forests of the lower Amazon Basin and the Amazon estuary on islands of clayish soils developed from sediments carried and deposited by the river, with large extensions on Marajo Island. The outer forests that are subject to a tidal flooding regime are true swamp communities, while the ones further inland (growing on 2-3 m higher ground) are more similar to varzeas and are flooded less frequently. Palms are the most conspicuous element and include *Astrocaryum murumuru, Euterpe oleracea, Manicaria saccifera, Mauritia martiana, Maximiliana regia, Oenocarpus bataua, Oenocarpus distichus*, and *Raphia taedigera*. Other trees include *Symphonia globulifera* and *Virola surinamensis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.El. Amazonian Flooded & Swamp Forest (D236)

Elcode: M640

\*Scientific Name: Amazon Delta Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Amazon Delta Swamp Forest Macrogroup

\*Colloquial Name: Amazon Delta Swamp Forest

\*Type Concept: Swamp forest of the lower Amazon Basin and the Amazon estuary on islands of clayish soils developed from the sediments carried by the river, with large extensions on Marajo Island. The outer forests subject to a tidal flooding regime are true swamp communities, while the ones further inland, growing on 2- to 3-m higher ground, are more similar to varzeas and get flooded less frequently. Palms are the more conspicuous element of this forest macrogroup; among them are *Astrocaryum murumuru, Raphia taedigera, Maximiliana regia, Oenocarpus distichus, Oenocarpus bataua, Mauritia martiana, Mauritia flexuosa, Euterpe oleracea, Manicaria saccifera* accompanied by *Symphonia globulifera, Virola surinamensis, Ceiba pentandra, Machaerium lanatum, Pithecellobium huberi*, and *Tabebuia aquatilis*. It occurs only in Brazil.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.El. Amazonian Flooded & Swamp Forest

M638. Central Amazon Floodplain Forest

Type Concept Sentence: Varzea and igapó forests of the mid and lower Amazon Basin in Brazil. The lower whitewater floodplains remain flooded up to 7 months per year, and the varzea forest can extend for kilometers away from the river if the topography is flat enough. Some diagnostic tree species are *Nectandra amazonum, Pyranhea trifoliata, Tabebuia barbata*, and *Vitex cymosa*. Igapó communities are located on white sands and are flooded for 6-7 months. They have a simple structure, with an open canopy of shrubs and few tree species. Those with a shorter flooding period and richer soils are more diverse and include *Myrciaria dubia, Dalbergia inundata*, and *Mabea nitida*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.El. Amazonian Flooded & Swamp Forest (D236)

Elcode: M638

\*Scientific Name: Central Amazon Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Central Amazon Floodplain Forest Macrogroup

\*Colloquial Name: Central Amazon Floodplain Forest

\*Type Concept: This macrogroup includes seasonal varzea forest and igapó forest of the whitewater and black- and clearwater rivers of the mid and lower Amazon Basin in Brazil. The lower whitewater floodplains are subjected to flooding of up to seven months a year, and the varzea forest can extend for kilometers away from the river if the topography is flat enough, though farther from the main stream the flooding season is shorter. Among the diagnostic tree species are *Pyranhea trifoliata, Vitex cymosa, Tabebuia barbata, Nectandra amazonum, Crescentia amazonica, Casearia aculeata, Ceiba pentandra, Manilkara amazonica, Pterocarpus amazonum*, and *Tapirira amazonica*. The igapo communities vary depending on the substrate and length of the flooding. Communities on white sands flooded for 6-7 months have a simple structure, with a 10-m tall, open canopy of scattered shrubs and few tree species. Those with a shorter flooding period and richer soils are more diverse and include *Myrciaria dubia, Dalbergia inundata, Borreria capitata, Eugenia chrysobalanoides, Eugenia cachoeirensis, Remijia tenuifolia, Couepia paraensis, Leopoldinia pulchra, Licania apetala, Licania heteromorpha, Eschweilera tenuifolia, Alchornea schomburgkii, Mabea nitida, Maprounea guianensis, Parkia discolor, Swartzia polyphylla, Swartzia argentea, Astrocaryum jauari*, among other species.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
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|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

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\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.El. Amazonian Flooded & Swamp Forest

M637. Northern Amazon Floodplain Forest

Type Concept Sentence: Several types of forest inundated by white- or clearwater rivers that include marsh and low forest communities with *Annona hypoglauca, Elaeoluma glabrescens, Euterpe precatoria, Heliconia marginata, Mauritia flexuosa, Montrichardia arborescens, Oenocarpus bataua, Oxandra mediocris, Pseudobombax munguba, Rhodognaphalopsis brevipes, Tabebuia insignis, Theobroma obovatum*, and *Vatairea guianensis*. Also includes black- or clearwater swamps with an irregular flooding regime and characterized by *Caryocar microcarpum, Macrolobium acaciifolium*, and *Cynometra marginata*. Distributed in Colombia in the lower Caquetá and Apaporis River basins and in the Japura River sub-basin in Brazil.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.El. Amazonian Flooded & Swamp Forest (D236)

Elcode: M637

\*Scientific Name: Northern Amazon Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Northern Amazon Floodplain Forest Macrogroup

\*Colloquial Name: Northern Amazon Floodplain Forest

\*Type Concept: This macrogroup includes several types of forest inundated by whitewater or by clearwater rivers, from tall multi-strata forest of the white riverbanks, to those in the depressions or low terraces, with hydromorphic, acidic soils. These areas are occupied by marsh and low forest communities with *Montrichardia arborescens, Annona hypoglauca, Pseudobombax munguba, Heliconia marginata, Costus scaber, Theobroma obovatum, Oxandra mediocris, Oxandra polyantha, Elaeoluma glabrescens, Vatairea guianensis, Euterpe precatoria, Oenocarpus bataua, Mauritia flexuosa, Tabebuia insignis var. monophylla, Mauritiella aculeata, Ocotea aff. neblinae, Rhodognaphalopsis brevipes, Euterpe catinga*, and *Clusia spathulifolia*. The macrogroup also includes blackwater- or clearwater-inundated swamps with an irregular flooding regime and characterized by *Caryocar microcarpum, Macrolobium acaciifolium*, and *Cynometra marginata*. The macrogroup is distributed in Colombia in the lower Caqueta and the Apaporis sub-basins and in the Japura River sub-basin in Brazil.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

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\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.El. Amazonian Flooded & Swamp Forest

M639. South-Central Amazon Floodplain Forest

Type Concept Sentence: Seasonal varzea and igapó forests of the white-, black- and clearwater rivers of the southern Amazon Basin in Bolivia and Brazil, located in the floodplains of the Madeira and Tapajoz rivers.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.El. Amazonian Flooded & Swamp Forest (D236)

Elcode: M639

\*Scientific Name: South-Central Amazon Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: South-Central Amazon Floodplain Forest Macrogroup

\*Colloquial Name: South-Central Amazon Floodplain Forest

\*Type Concept: This macrogroup includes seasonal varzea forest and igapó forest of the whitewater and black- and clearwater rivers of the southern Amazon Basin in Bolivia and Brazil, in the floodplains of the Madeira and Tapajoz river basins.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.El. Amazonian Flooded & Swamp Forest

M636. Southern Amazon Swamp Forest

Type Concept Sentence: Includes two types of forest in southern Peru, Bolivia, and southwestern Brazil. The first is a low to mid-height forest with an open canopy that develops on topographically depressed areas in the terra firme forest, on sandy soils. These depressions accumulate water from precipitation and nearby clearwater streams runoff. Characteristic species include *Alchornea discolor, Buchenavia macrophylla, Cariniana domestica, Clusia amazonica, Couepia cf. obovata, Cybianthus minutiflorus, Licania apetala, Licania micrantha, Lueheopsis althaeiflora, Pera nitida, Protium nodulosum, Qualea albiflora, Qualea wittrockii, Sclerolobium tinctorium, Swartzia simplex, Symphonia globulifera, Tachigali chrysophylla, Tococa guianensis*, and *Xylopia parviflora*. The second forest type is monodominant and mixed palm swamps of *Mauritia flexuosa*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.El. Amazonian Flooded & Swamp Forest (D236)

Elcode: M636

\*Scientific Name: Southern Amazon Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Southern Amazon Swamp Forest Macrogroup

\*Colloquial Name: Southern Amazon Swamp Forest

\*Type Concept: Two main types of forest are included in this macrogroup. The first is a low to mid-height forest of open canopy that develops on topographically depressed areas in the terra firme forest, on sandy soils likely corresponding to old riverbeds. These depressions accumulate water from precipitation and nearby clearwater streams runoff. Characteristic composition includes *Qualea albiflora, Qualea wittrockii, Protium nodulosum, Sclerolobium tinctorium, Cariniana domestica, Lueheopsis althaeiflora, Swartzia simplex, Xylopia parviflora, Xylopia spruceana, Licania egleri, Licania micrantha, Licania apetala, Sloanea rufa, Pera nitida, Symphonia globulifera, Andira inermis, Couepia cf. obovata, Pachira aquatica, Cybianthus minutiflorus, Buchenavia macrophylla, Alchornea discolor, Tachigali chrysophylla, Tococa guianensis, Clusia amazonica*, and *Alibertia myrcifolia*. The other type corresponds to monodominant and mixed palm swamps of *Mauritia flexuosa*. The macrogroup is distributed in southern Peru, Bolivia and southwestern Brazil.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.El. Amazonian Flooded & Swamp Forest

M635. Southwestern Amazon Floodplain Forest

Type Concept Sentence: Seasonal varzea and igapó forests of white-, black-, and clearwater rivers of the southwestern Amazon in Bolivia, Peru and Brazil (where they occur in the upper and middle basins of the Purus and Madeira rivers). Whitewater flooded forests (varzea) vary depending on their location and flood levels, with higher banks flooded only sporadically and lower banks and floodplains inundated seasonally up to 1 m for 3-4 months/year. Blackwater forests (igapó) represent a complex of forest types, including riparian zones and surrounding lagoons, all inundated seasonally with flowing waters which are high in humic acid content.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.El. Amazonian Flooded & Swamp Forest (D236)

Elcode: M635

\*Scientific Name: Southwestern Amazon Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Southwestern Amazon Floodplain Forest Macrogroup

\*Colloquial Name: Southwestern Amazon Floodplain Forest

\*Type Concept: This macrogroup includes seasonal varzea forest and igapo forest of the whitewater and black- and clearwater rivers of the southwestern Amazon in Bolivia, Peru and in Brazil in the upper and mid basins of the Purus and Madeira rivers. Whitewater flooding forests (varzea) vary depending on their location and flooding levels, with higher banks flooded only sporadically and lower banks and floodplains inundated seasonally up to 1 m for 3-4 months a year. Forests are 25-30 m tall and have an irregular canopy and several strata. Diagnostic species are *Manilkara bidentata ssp. surinamensis (= Manilkara surinamensis), Calycophyllum spruceanum, Hura crepitans, Gustavia augusta, Gustavia hexapetala, Dypterix micrantha, Xylopia ligustrifolia, Clarisia biflora, Pouteria bangii, Ceiba pentandra, Apeiba tibourbou, Astrocaryum murumuru, Chelyocarpus chucco, Bactris concinna, Terminalia amazonia, Cavanillesia hylogeiton, Swietenia macrophylla, Theobroma speciosum, Couroupita guinanensis, Virola surinamensis, Ficus insipida, Ficus trigona, Diospyros ebenacea, Heliconia marginata, Heliconia episcopalis, Duguetia quitarensis*, and *Salacia elliptica*. Blackwater flooding forests (igapó) represent a complex of forest types, including riparian and those of depressions and surrounding lagoons, all of them inundated seasonally with flowing water which is poor in sediments but high in humic acid contents. Diagnostic communities are formed by *Macrolobium acaciifolium, Macrolobium suaveolens, Campsiandra laurifolia, Maquira coriacea, Couratari tenuicarpa, Virola sebifera, Eschweilera albiflora, Eschweilera coriacea, Eschweilera turbinata, Eschweilera parvifolia, Symmeria paniculata, Sclerolobium guianense, Mabea occidentalis, ordia nodosa, Astrocaryum jauari, Bactris riparia, Bactris simplicifrons, Hevea brasiliensis, Genipa spruceana*, among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
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RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.El. Amazonian Flooded & Swamp Forest

M633. Western Amazon Floodplain Forest

Type Concept Sentence: Seasonal varzea and igapó forest of the white-, black- and clearwater rivers of the Western Amazon in Colombia, Ecuador, Peru, and Brazil west of the Jurua River. Whitewater flooded forests (varzea) have large annual river level fluctuations and are flooded from 3-5 months a year depending on their location. Blackwater flooded forests (igapó) develop on flat to slightly depressed floodplains with a meandering drainage system. They have mostly white sand soils, with high concentrations of tannic substances and humic acids from the decomposition of organic material, a lower stature, less dense vegetation, and fewer species than varzea forests.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.El. Amazonian Flooded & Swamp Forest (D236)

Elcode: M633

\*Scientific Name: Western Amazon Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Western Amazon Floodplain Forest Macrogroup

\*Colloquial Name: Western Amazon Floodplain Forest

\*Type Concept: This macrogroup includes seasonal varzea forest and igapo forest of the whitewater and black- and clearwater rivers of the western Amazon in Colombia, Ecuador, Peru and in Brazil, westward from the Jurua River. Whitewater flooding forests (varzea) are subject to ample annual river level fluctuations and are flooded from 3 to 5 months a year depending on their location, with topographic depressions permanently saturated. Characteristic species of tall trees are *Ceiba pentandra, Vochysia venulosa, Ficus insipida, Calycophyllum spruceanum, Terminalia oblonga, Sterculia apetala, Guarea guidonia, Guarea macrophylla, Perebea guianensis, Chimarrhis glabriflora, Celtis schippii, Zygia juruana, Mouriri grandiflora, Parkia inundabilis*, and *Piptadenia pteroclada*. Blackwater flooding forests (igapo) develop on flat to slightly depressed floodplains with a meandering drainage system and mainly white sand soils, with high concentrations of tannic substances and humic acids from the decomposition of the organic material lining the soils. In general they have lower stature, are less dense and less species-rich than the varzea forests. Communities are differentiated by their proximity to the river, the lower ones flooded up to eight months a year and the more distal ones, up to five months in water 5 m deep. Prominent species are *Eugenia inundata, Senefeldera inclinata, Hevea guianensis, Hevea brasiliensis, Eschweilera coriacea, Couratari oligantha, Macrolobium acaciifolium, Maquira coriacea, Maquira guianensis, Coussapoa trinervia, Matayba inelegans*, and *Matayba macrocarpa*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
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RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.El. Amazonian Flooded & Swamp Forest

M634. Western Amazon Swamp Forest

Type Concept Sentence: Permanently inundated forests of the western Amazon Basin on flat to depressed topography with continuous water input from runoff, precipitation, slow drainage of meandering blackwater rivers, and/or filtration from nearby whitewater rivers. Also found surrounding waterbodies. Formation of peat is common. Particularly well developed in northeastern Peru, but also distributed in Colombia, Ecuador and Brazil, west of the Jurua River. The dominant species is *Mauritia flexuosa*, which can form monodominant forests or occur in association with *Croton tessmannii, Euterpe oleracea, Geonoma acaulis, Mauritiella aculeata, Oenocarpus mapora, Parkia inundabilis, Scheleea brachyclada, Tabebuia insignis, Tabernaemontana siphilitica, Virola pavonis*, or *Virola surinamensis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.El. Amazonian Flooded & Swamp Forest (D236)

Elcode: M634

\*Scientific Name: Western Amazon Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Western Amazon Swamp Forest Macrogroup

\*Colloquial Name: Western Amazon Swamp Forest

\*Type Concept: This macrogroup includes permanently inundated forests of the western Amazon Basin on flat to depressed topography with continuous water input from runoff of adjacent higher terrain, precipitation, slow draining of blackwater meandering rivers, and some filtration of nearby whitewater rivers. It is also found surrounding permanent or seasonal waterbodies. Formation of peat is common. It is particularly well-developed in northeastern Peru, but is distributed in Colombia, Ecuador and Brazil, west of the Jurua River. The dominant species is *Mauritia flexuosa* which can form monodominant forests or occur in association with *Euterpe oleracea, Geonoma acaulis, Oenocarpus mapora, Scheleea brachyclada, Mauritiella aculeata, Virola surinamensis, Virola pavonis, Tabernaemontana siphilitica, Croton tessmannii, Symphonia globulifera, Parkia inundabilis*, or *Tabebuia insignis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
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RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
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|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest

D237. Brazilian-Parana Flooded & Swamp Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.4.Em. Tropical Flooded & Swamp Forest (F029)

Elcode: D237

\*Scientific Name: Brazilian-Parana Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Brazilian-Parana Flooded & Swamp Forest Division

\*Colloquial Name: Brazilian-Parana Flooded & Swamp Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M641 | Brazilian Atlantic Coastal Plain Swamp Forest |
| M642 | Parana Floodplain Forest |
| M646 | Pantanal Floodplain Forest |
| M643 | Cerrado Floodplain Forest |
| M644 | Beni Chiquitano Swamp Forest |
| M645 | Beni Floodplain Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest

M641. Brazilian Atlantic Coastal Plain Swamp Forest

Type Concept Sentence: Periodically flooded forests occurring either along rivers that flow from central and southern Brazil to the Atlantic Ocean or on swales of the extensive dune and beach-ridge systems (restingas) of the Brazilian coast. These are short-statured forests with an irregular canopy, with occasional interruptions caused by depressions where the water level is higher and aquatic vegetation develops. Species composition varies depending on the topography and the saturation levels of the soil. Diagnostic species are *Acrostichum danaeifolium, Aechmea pineliana, Bactris setosa, Blechnum serrulatum, Calophyllum antillanum, Cecropia lyratiloba, Geonoma schottiana, Rheedia brasiliensis, Symphonia globulifera*, and *Tabebuia cassinoides*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest (D237)

Elcode: M641

\*Scientific Name: Brazilian Atlantic Coastal Plain Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Brazilian Atlantic Coastal Plain Swamp Forest Macrogroup

\*Colloquial Name: Brazilian Atlantic Coastal Plain Swamp Forest

\*Type Concept: Forests periodically flooded due to their location along rivers that flow from central and southern Brazil to the Atlantic Ocean and also those of the swales of the extensive dune and beach-ridge systems (restingas) along the Brazilian coast. They are short forests with an irregular canopy whose distribution is interrupted due to depressions where the water level is higher and aquatic vegetation develops. These woods vary in their composition depending on the topography and the saturation levels of the soils. Diagnostic species are *Tabebuia cassinoides, Cecropia lyratiloba, Bactris setosa, Symphonia globulifera, Calophyllum antillanum (= Calophyllum brasiliense), Geonoma schottiana, Rheedia brasiliensis, Aechmea pineliana, Acrostichum danaeifolium*, and *Blechnum serrulatum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
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RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest

M642. Parana Floodplain Forest

Type Concept Sentence: Riverine forests on rocky to sandy/gravelly substrates of basaltic origin in the Alto Parana region of Brazil, Argentina and Paraguay. Due to flooding dynamics, these forests consist of a complex of herbaceous, shrub, and tree riparian communities, with open canopies of irregular height. A large biomass of vascular and nonvascular epiphytes grow on the trees. Diagnostic species are *Calliandra selloi, Chomelia obtusa, Croton urucurana, Cyperus iria, Dryopteris triphylla, Echinodorus grandiflorus, Enterolobium contortisiliquum, Inga marginata, Lafoensia nummularifolia, Lonchocarpus leucanthus, Luehea divaricata, Mimosa uraguensis, Nectandra lanceolata, Nectandra megapotamica, Panicum spathellosum, Phyllanthus sellowianus, Sapium haematospermum*, and *Zephyranthes flavissima*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest (D237)

Elcode: M642

\*Scientific Name: Parana Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Parana Floodplain Forest Macrogroup

\*Colloquial Name: Parana Floodplain Forest

\*Type Concept: Riverine forests on rocky to sandy/gravelly substrates of basaltic origin in the Alto Parana region of Brazil, Argentina and Paraguay. In this environment combined with the flooding dynamics, a complex of herbaceous, shrub and tree riparian communities develops, with a generally open canopy and irregular height. These forests have a large amount of vascular and nonvascular epiphytes on the trees. The following list of species is diagnostic for this macrogroup: *Zephyranthes flavissima, Chomelia obtusa, Panicum spathellosum, Cyperus iria, Echinodorus grandiflorus, Justicia* sp., *Cephalanthus glabratus, Mimosa uraguensis, Calliandra selloi, Lafoensia nummularifolia, Phyllanthus sellowianus, Trichilia elegans, Sapium haematospermum, Croton urucurana, Dryopteris triphylla, Inga marginata, Nectandra lanceolata, Nectandra megapotamica, Lonchocarpus leucanthus, Guarea kunthiana, Euerpe edulis, Bastardiopsis densiflora, Alchornea triplinervia, Luehea divaricata, Inga vera ssp. affinis, Ruprechtia laxiflora, Enterolobium contortisiliquum, Myrciaria rivularis, Esenbeckia grandiflora, Pithecellobium scalare, Gleditsia amorphoides, Sebastiana brasiliensis, Celtis pubescens, Chusquea ramosissima, Guadua angustifolia*, and *Cyathea atrovirens*. The bamboo-like *Chusquea* and *Guadua* can form extensive monodominant stands and generally are the result of large-scale disturbance.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest

M646. Pantanal Floodplain Forest

Type Concept Sentence: Riparian or gallery forests of the Pantanal region of Brazil, Bolivia, and Paraguay. They occupy the riverbanks and higher areas of the floodplain that drains into the Paraguay River. Seasonal flooding lasts from a few weeks to a few months each year. Characteristic species are *Albizia inundata, Coccoloba guaranitica, Geoffroea spinosa, Lonchocarpus fluvialis*, and *Microlobium paraguensis*. Also includes a group of short and open deciduous forests with abundant palms that are flooded seasonally. This type occurs in the southwestern corner of the Pantanal. Common species are *Acrocomia totai, Copernicia alba, Magonia pubescens*, and *Microlobium foetidus ssp. paraguensis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest (D237)

Elcode: M646

\*Scientific Name: Pantanal Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Pantanal Floodplain Forest Macrogroup

\*Colloquial Name: Pantanal Floodplain Forest

\*Type Concept: Riverine and swamp forests, mostly gallery forests, of the Pantanal region of western Mato Grosso and Mato Grosso do Sul in Brazil, southeastern Bolivia, and northeastern Paraguay. They occupy the riverbanks and relatively topographically higher areas of the floodplain that drains into the Paraguay River, in situations of seasonal flooding of a few weeks to a few months. Characteristic species are *Albizia inundata, Geoffroea spinosa, Adelia spinosa, Microlobium paraguensis, Crataeva tapia, Laetia americana, Lonchocarpus fluvialis, Zygia pithecolobioides, Aporosella chacoensis, Coccoloba guaranitica, Banara arguta, Vochysia* spp., and *Combretum lanceolatum*. This macrogroup also includes a group of short and open deciduous forests, and wooded savannas with abundant palms, not directly associated with riparian positions, which get saturated or flooded due to seasonal precipitation. This type occurs in the southwestern corner of the Pantanal region, and the common species are *Copernicia alba, Microlobium foetidus ssp. paraguensis, Sphinctanthus microphyllus, Acacia monacantha, Combretum lanceolatum, Tabebuia aurea, Machaerium hirtum, Rheedia brasiliensis, Myrcia fallax, Acrocomia totai, Sterculia striata, Magonia pubescens, Cochlospermum tetraporum, Prosopis nigra, Prosopis ruscifolia*, and *Calycophyllum multiflorum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest

M643. Cerrado Floodplain Forest

Type Concept Sentence: Riparian and floodplain forests of the Brazilian Cerrado and Bolivian Chiquitania regions. They are forested systems that develop along wide rivers with defined courses, generally occupying a narrow strip of about 100 m on either side of the river (but can be wider if the valley is flat and broad). Several of the canopy species are deciduous because of the seasonal climate and short period of flooding. In Bolivia, characteristic species are *Albizia niopoides, Attalea phalerata, Cariniana ianeirensis, Gallesia integrifolia*, and *Vitex cymosa*. In the Brazilian Cerrado two characteristic species are *Apeiba tibourbou* and *Enterolobium contortisiliquum*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest (D237)

Elcode: M643

\*Scientific Name: Cerrado Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Cerrado Floodplain Forest Macrogroup

\*Colloquial Name: Cerrado Floodplain Forest

\*Type Concept: The macrogroup represents the riparian and floodplain forests of the Brazilian Precambrian shield in the Brazilian Cerrado and Bolivian Chiquitania regions. They are forested systems that develop along wide rivers with defined courses, and can limit externally either with savannas or with mesophytic forests, with which there may be a complex transition, although the riparian forests are characterized for being higher and more dense. They generally occupy a narrow strip of about 100 m on either side of the river, but if the valley is flat and broad, the riparian forest strip can be wider. The substrate is variable, generally alluvial, and the forest is influenced by the flooding regime of the river. Since these regions have a seasonal climate, the flooding period and reach are not that long. Due to the seasonality of the climate, several of the canopy species are deciduous; in Bolivia the characteristic species are *Gallesia integrifolia, Cariniana ianeirensis, Vitex cymosa, Albizia niopoides, Attalea phalerata, Cyathea pungens, Ficus pertusa, Ficus adhatodaeifolia, Genipa americana, Pouteria macrophylla, Salacia elliptica, Sapindus saponaria, Syagrus sancona, Triplaris americana, Cordia alliodora, Erythrina dominguezii, Nectandra megapotamica, Nectandra hihua, Licaria triandra, Chrysophyllum gonocarpum, Solanum sessile*. In the Brazilian Cerrado riparian forests some of the characteristic species are *Anadenanthera* spp., *Apeiba tibourbou, Aspidosperma* spp., *Inga* spp., *Enterolobium contortisiliquum, Celtis iguanaea, Myracroduon urundeuva, Triplaris gardneriana, Sterculia striata, Tabebuia* spp., *Cecropia pachystachya, Orbignya barbosiana (= Attalea speciosa), Ficus* spp., *Gynerium sagittatum*, and *Guadua paniculata*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest

M644. Beni Chiquitano Swamp Forest

Type Concept Sentence: Lowland swamp forests of the Beni floodplains (Bolivia) that remain flooded with oligotrophic, acidic waters for several months per year. The forests occur within a matrix consisting of extensive marshes dominated by large sedges or grasses (mainly *Cyperus giganteus*). These swamps have low species richness, and can consist of almost monospecific stands of *Tabebuia insignis* and *Symphonia globulifera*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest (D237)

Elcode: M644

\*Scientific Name: Beni Chiquitano Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Beni Chiquitano Swamp Forest Macrogroup

\*Colloquial Name: Beni Chiquitano Swamp Forest

\*Type Concept: These are lowland swamp forests of the Beni floodplains (Bolivia) that remain flooded with oligotrophic, acidic waters for several months per year. The forests occur within a matrix consisting of extensive marshes dominated by large sedges or grasses (mainly *Cyperus giganteus*). These swamps have low species richness, and can consist of almost monospecific stands of *Tabebuia insignis* and *Symphonia globulifera*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2016)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest

M645. Beni Floodplain Forest

Type Concept Sentence: Seasonally flooded forests that develop on levees or other terrain that is slightly higher than the streams that drain the mostly flat alluvial plains of the Beni savannas in Bolivia. Soils are clayish alkaline. These forests form corridors within a savanna matrix where there is a pronounced seasonal climate. Diagnostic species are *Albizia inundata, Alchornea schomburgkii, Buchenavia oxycarpa, Machaerium aristulatum, Machaerium hirtum*, and *Swartzia jorori*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.Em. Brazilian-Parana Flooded & Swamp Forest (D237)

Elcode: M645

\*Scientific Name: Beni Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Beni Floodplain Forest Macrogroup

\*Colloquial Name: Beni Floodplain Forest

\*Type Concept: These are seasonally flooded forests that develop on the levees or slightly higher terrain than the streams that drain the mostly flat alluvial plains of the Beni savannas in Bolivia. Soils are clayish alkaline. They form corridors immersed in a savanna matrix and have a pronounced seasonal climate. Species that are diagnostic for this macrogroup are *Machaerium aristulatum, Machaerium hirtum, Swartzia jorori, Alchornea schomburgkii, Buchenavia oxycarpa, Albizia inundata*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.En. Chaco Flooded & Swamp Forest & Woodland

D238. Chaco Flooded & Swamp Forest & Woodland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.A.4.En. Tropical Flooded & Swamp Forest (F029)

Elcode: D238

\*Scientific Name: Chaco Flooded & Swamp Forest & Woodland Division

\*Common (Translated Scientific) Name: Chaco Flooded & Swamp Forest & Woodland Division

\*Colloquial Name: Chaco Flooded & Swamp Forest & Woodland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M650 | Southern Chaco Floodplain Forest & Woodland |
| M647 | Northern Chaco Floodplain Forest & Woodland |
| M649 | Northern Chaco Palm Swamp |
| M648 | Northern Chaco Riparian Scrub & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.En. Chaco Flooded & Swamp Forest & Woodland

M650. Southern Chaco Floodplain Forest & Woodland

Type Concept Sentence: Low Chaco forests typical of poorly drained, clay soils in topographic depressions of the alluvial plains of the southern Chaco in Argentina. They present an impoverished Chaco flora compared to the floodplain forests of the northern Chaco, and include several species from the Monte and northern Patagonia biogeographic provinces. These forests may temporarily flood during the rainy season. Diagnostic species are *Aspidosperma quebracho-blanco, Bulnesia bonariensis, Bulnesia retama, Geoffroea decorticans, Grabowskia obtusa, Grahamia bracteata, Larrea cuneifolia, Lycium tenuispinosum, Maytenus vitis-idaea, Mimozyganthus carinatus, Plectrocarpa tetracantha, Prosopis reptans, Prosopis sericantha*, and *Suaeda divaricata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.En. Chaco Flooded & Swamp Forest & Woodland (D238)

Elcode: M650

\*Scientific Name: Southern Chaco Floodplain Forest & Woodland Macrogroup

\*Common (Translated Scientific) Name: Southern Chaco Floodplain Forest & Woodland Macrogroup

\*Colloquial Name: Southern Chaco Floodplain Forest & Woodland

\*Type Concept: Low Chaco forests typical of poorly drained clay soils in topographic depressions of the alluvial plains of the Southern Chaco in Argentina. They present an impoverished Chaco flora compared to the floodplain forests of the Northern Chaco, but with a differential presence of southern species whose optimum is in the Monte and northern Patagonia biogeographic provinces. These forests may temporarily flood during the rainy season. Diagnostic species are *Aspidosperma quebracho-blanco, Bulnesia bonariensis, Bulnesia retama, Geoffroea decorticans, Grabowskia obtusa, Grahamia bracteata, Larrea cuneifolia, Lycium tenuispinosum, Maytenus vitis-idaea, Mimozyganthus carinatus, Plectrocarpa tetracantha, Prosopis reptans, Prosopis sericantha*, and *Suaeda divaricata*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M651 Southern Chaco Palm Swamp Macrogroup | M651 concept covered by M650 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.En. Chaco Flooded & Swamp Forest & Woodland

M647. Northern Chaco Floodplain Forest & Woodland

Type Concept Sentence: Low-statured forests and shrublands with closed canopies 3-6 m in height and scattered emergents up to 15 m tall. Occurs on poorly drained soils with a silt-clayish texture in the northern Chaco in Argentina, Bolivia, and Paraguay, where the soils and seasonal precipitation regime have created a topography of mounts and swales. Includes also the more humid floodplain forests of the northeastern Chaco where seasonal precipitation is higher and there is a more defined stream network. These forests are seasonally inundated or saturated, and the canopies reach 15-18 m high.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.En. Chaco Flooded & Swamp Forest & Woodland (D238)

Elcode: M647

\*Scientific Name: Northern Chaco Floodplain Forest & Woodland Macrogroup

\*Common (Translated Scientific) Name: Northern Chaco Floodplain Forest & Woodland Macrogroup

\*Colloquial Name: Northern Chaco Floodplain Forest & Woodland

\*Type Concept: This macrogroup includes low forests and shrublands of closed canopy at 3-6 m high and scattered emergents up to 15 m tall, which is the vegetation of poorly drained soils with silt clayish texture that occur in the northern Chaco in Argentina, Bolivia, and Paraguay in situations where the combination of the soils and the seasonal precipitation regime originate a microtopography of mounts and swales. The following list of species is diagnostic for this macrogroup: *Bulnesia sarmientoi, Aspidosperma triternatum, Tabebuia nodosa, Cordia bordasii, Erythroxylum patentissimum, Acanthosyris falcata, Calycophyllum multiflorum, Euglypha rojasiana, Trithrinax schizophylla, Prosopis nuda, Ruellia coerulea, Rojasia gracilis*, and *Cestrum guaraniticum*. It includes also the more humid floodplain forests of the northeastern Chaco in Argentina and Paraguay with higher seasonal precipitation and a more defined stream network. These forests are seasonally inundated or saturated and reach 15-18 m high. Their typical elements are *Schinopsis balansae, Astronium balansae, Diplokeleba floribunda, Aspidosperma triternatum, Prosopis nigra, Tabebuia nodosa, Albizia inundata, Sorocea saxicola, Maytenus ilicifolia, Calycophyllum multiflorum, Prosopis vinalillo, Trithrinax biflabellata*, and *Schinus fasciculatus*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.En. Chaco Flooded & Swamp Forest & Woodland

M649. Northern Chaco Palm Swamp

Type Concept Sentence: Semi-open to semi-dense forests of the northern Chaco in Bolivia, Paraguay and Argentina, dominated by *Copernicia alba* and associated with various hygrophilous tree and shrub species. They develop on alkaline soils of fine silty clay texture that become saturated and can be somewhat brackish. Distributed in topographic depressions that are flooded by precipitation or river overflow. Diagnostic species include *Acacia monacantha, Coccoloba paraguariensis, Combretum lanceolatum, Copernicia alba, Microlobium paraguensis, Muellera fluvialis, Parkinsonia aculeata, Prosopis chilensis, Prosopis elata, Prosopis nigra, Prosopis ruscifolia, Prosopis vinalillo, Sphinctanthus microphyllus*, and *Tabebuia nodosa*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.En. Chaco Flooded & Swamp Forest & Woodland (D238)

Elcode: M649

\*Scientific Name: Northern Chaco Palm Swamp Macrogroup

\*Common (Translated Scientific) Name: Northern Chaco Palm Swamp Macrogroup

\*Colloquial Name: Northern Chaco Palm Swamp

\*Type Concept: These are palm forests of the northern Chaco in Bolivia, Paraguay and Argentina. They are semi-open to semi-dense forests, dominated by the Carandá palm (*Copernicia alba*) associated with various hygrophilous trees and shrubs species. They develop on alkaline soils that get saturated, of fine silty clay texture, and often somewhat brackish and distributed in topographic depressions flooded by precipitation or river overflow. The following species are diagnostic: *Copernicia alba, Microlobium paraguensis, Acacia monacantha, Muellera fluvialis, Coccoloba paraguariensis, Combretum lanceolatum, Sphinctanthus microphyllus, Prosopis vinalillo, Prosopis elata, Prosopis ruscifolia, Prosopis chilensis, Prosopis nigra, Tabebuia nodosa, Parkinsonia aculeata, Pennisetum frutescens, Acacia caven, Panicum prionitis, Panicum trichanthum, Sporobolus phleoides, Gouinia paraguayensis, Schizachyrium condensatum (= Andropogon condensatus), Heteropogon contortus, Eupatorium* spp., *Lycium* spp., and *Solanum* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.A.4.En. Chaco Flooded & Swamp Forest & Woodland

M648. Northern Chaco Riparian Scrub & Woodland

Type Concept Sentence: Riparian forests of the floodplains of the Parapety and Paraguay rivers in Bolivia, Paraguay and northern Argentina. These are dense forests, from semi-deciduous to seasonal evergreen, usually dominated by the tree *Albizia inundata*. They grow in loamy or clayish loamy soils, which are flooded for several months a year by mesotrophic waters from river overflows that flow slowly across the floodplain. Diagnostic species include *Albizia inundata, Aporosella chacoensis, Banara arguta, Bergeronia sericea, Crataeva tapia, Genipa americana, Geoffroea striata, Inga uruguensis, Laetia americana, Machaonia brasiliensis, Ocotea suaveolens, Piptadenia robusta, Pouteria gardneriana, Ruprechtia brachysepala, Sapindus saponaria*, and *Senna grandis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.A.4.En. Chaco Flooded & Swamp Forest & Woodland (D238)

Elcode: M648

\*Scientific Name: Northern Chaco Riparian Scrub & Woodland Macrogroup

\*Common (Translated Scientific) Name: Northern Chaco Riparian Scrub & Woodland Macrogroup

\*Colloquial Name: Northern Chaco Riparian Scrub & Woodland

\*Type Concept: Riparian forests of the floodplains of the Parapety and Paraguay rivers in Bolivia, Paraguay and northern Argentina. These are dense forests, from semi-deciduous to seasonal evergreen, usually dominated by the tree *Albizia inundata*. They grow in loamy or clayish loamy soils, which are flooded for several months a year by mesotrophic waters from river overflows, which mostly flow slowly across the floodplain. Diagnostic species include *Albizia inundata, Aporosella chacoensis, Banara arguta, Bergeronia sericea, Crataeva tapia, Genipa americana, Geoffroea striata, Inga uruguensis, Laetia americana, Machaonia brasiliensis, Ocotea suaveolens, Piptadenia robusta, Pouteria gardneriana, Ruprechtia brachysepala, Sapindus saponaria*, and *Senna grandis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1.B. Temperate & Boreal Forest & Woodland

Temperate & Boreal Forest & Woodland is typically dominated by broad-leaved deciduous and needle-leaved trees, with some broad-leaved evergreens in warmer regions, and a climate that varies from warm-temperate with only rare frosts to very cold subarctic conditions. It is found across the globe in the mid-latitudes, typically between 25° and 60-70°N and S latitude, and includes boreal, cool-temperate, and warm-temperate/Mediterranean forests.

1.B.1. Warm Temperate Forest & Woodland

Warm Temperate Forest & Woodland is dominated by broad-leaved evergreen trees, sometimes with dwarfed stems and small, sclerophyllous leaves (in Mediterranean climates), or various combinations of broad-leaved deciduous, broad-leaved evergreen and needle-leaved evergreen conifer trees. Winters are mild (mostly frost-free) and may be the rainiest season, springs are temperate-humid, summers are hot-dry, and autumn is often dry.

1. Forest & Woodland

1.B.1.Ef. Chilean Warm Temperate Forest & Woodland

D239. Chilean Warm Temperate Forest & Woodland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.1.Ef. Warm Temperate Forest & Woodland (F018)

Elcode: D239

\*Scientific Name: Chilean Warm Temperate Forest & Woodland Division

\*Common (Translated Scientific) Name: Chilean Warm Temperate Forest & Woodland Division

\*Colloquial Name: Chilean Warm Temperate Forest & Woodland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M652 | Chilean Mediterranean Sclerophyllous Forest |
| M653 | Chilean Mediterranean Deciduous Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.1.Ef. Chilean Warm Temperate Forest & Woodland

M652. Chilean Mediterranean Sclerophyllous Forest

Type Concept Sentence: Sclerophyllous forests of central Chile, grading from xeric in the north to subhumid in the south. Distributed from 0-1300 m elevation on the coast, central valleys, and hills of the Coastal Cordillera, and from 1400-2200 m on the slopes of the Andes in central Chile. Moister forests have canopies that are 8-12 m high and almost closed, and have a more diverse species assemblage. Diagnostic tree species are *Crinodendron patagua, Cryptocarya alba, Persea lingue*, and *Peumus boldus*. Under drier conditions the canopy has a lower stature and is more open. *Lithrea caustica* and *Quillaja saponaria* are common trees, and the forest has a dense thorny shrub stratum. The montane sclerophyllous forests have an open canopy with the dominant species being *Kageneckia angustifolia, Guindilia trinervis*, and *Colliguaja integerrima*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.1.Ef. Chilean Warm Temperate Forest & Woodland (D239)

Elcode: M652

\*Scientific Name: Chilean Mediterranean Sclerophyllous Forest Macrogroup

\*Common (Translated Scientific) Name: Chilean Mediterranean Sclerophyllous Forest Macrogroup

\*Colloquial Name: Chilean Mediterranean Sclerophyllous Forest

\*Type Concept: This macrogroup includes several types of sclerophyllous forests distributed in the central Chilean region, characterized by a Mediterranean climate, grading from xeric towards its northern distribution to sub-humid towards the southern end of its range. The altitudinal range goes from 0-1300 m asl for forests distributed on the coast, central valleys and inland hills of the Coastal Cordillera, and from 1400-2200 m for forests growing in the lower montane and montane western slopes of the Andes in central Chile. The structure of the different types of Chilean sclerophyllous forests depends on the moisture available, with better humidity conditions in areas facing the ocean, areas with south aspect and in the valleys. In those cases forests are 8-12 m high, more diverse, have an almost closed canopy and a significant presence of vascular epiphytes. Diagnostic tree species are *Cryptocarya alba, Peumus boldus Persea lingue, Lithrea caustica, Schinus latifolius*, and elements such as *Beilshmiedia miersii* and *Crinodendron patagua*. Under drier conditions the canopy becomes shorter and fairly open with *Lithrea caustica* and *Quillaja saponaria*, and the shrub stratum dominates the cover with thorny species such as *Colliguaja odorifera, Retanilla trineriva, Escallonia pulverulenta, Lobelia excelsa, Aextoxicon punctatum*, and the succulents *Puya berteroniana* and *Echinopsis chiloensis* accompanied by several cacti species and very few herbs. Sites across the distribution of this macrogroup used to show extensive palm groves of the endemic *Jubaea chilensis*. Many more tree and shrub species characterize this type but the specific assemblages are determined by the moisture and the edaphic conditions. The montane sclerophyllous forests tend to have an open canopy with dominants *Kageneckia angustifolia, Guindilia trinervis*, and *Colliguaja integerrima*, with *Quillaja saponaria* and *Lithrea caustica* becoming more abundant at lower montane elevations, and a diverse shrub stratum with *Proustia cuneifolia, Colliguaja odorifera*, and *Satureja gilliesii*. The herbaceous stratum is more diverse and dominant in the montane communities.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.1.Ef. Chilean Warm Temperate Forest & Woodland

M653. Chilean Mediterranean Deciduous Forest

Type Concept Sentence: Deciduous forests of the central Chilean region, characterized by a moist Mediterranean climate. They are distributed in subhumid to humid conditions in the higher elevations of the Coastal Cordillera from 1000-2200 m elevation and in the western slopes of the Andes in central Chile from 900-1800 m elevation. The canopy is closed, 15-20 m high, and dominated by deciduous species as well as evergreen lauroid and sclerophyllous species. Diagnostic species are *Austrocedrus chilensis, Cryptocarya alba, Nothofagus alessandrii, Nothofagus glauca, Nothofagus macrocarpa, Nothofagus obliqua, Persea lingue, Ribes punctatum*, and in the understory *Aristotelia chilensis, Azara integrifolia, Azara petiolaris, Gevuina avellana, Kageneckia oblonga*, and *Lomatia hirsuta*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.1.Ef. Chilean Warm Temperate Forest & Woodland (D239)

Elcode: M653

\*Scientific Name: Chilean Mediterranean Deciduous Forest Macrogroup

\*Common (Translated Scientific) Name: Chilean Mediterranean Deciduous Forest Macrogroup

\*Colloquial Name: Chilean Mediterranean Deciduous Forest

\*Type Concept: This macrogroup represents the deciduous forests of the central Chilean region, characterized by a moist Mediterranean climate. These are forests mostly distributed in sub-humid to humid conditions that occur in the higher elevations of the Coastal Cordillera from 1000-2200 m elevation and in the Andean western slopes of central Chile from 900-1800 m elevation. The canopy is closed, 15-20 m high and dominated by deciduous trees species accompanied by evergreen lauroid and sclerophyllous species. Diagnostic canopy species are *Nothofagus macrocarpa, Ribes punctatum, Nothofagus glauca, Nothofagus obliqua, Austrocedrus chilensis, Nothofagus alessandrii, Cryptocarya alba, Persea lingue*, and in the understory are *Aristotelia chilensis, Gevuina avellana, Azara petiolaris, Azara integrifolia, Lomatia hirsuta, Kageneckia oblonga, Sophora macrocarpa*, among many other species.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.1.Eg. Southeastern South American Warm Temperate Forest & Woodland

D240. Southeastern South American Warm Temperate Forest & Woodland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.1.Eg. Warm Temperate Forest & Woodland (F018)

Elcode: D240

\*Scientific Name: Southeastern South American Warm Temperate Forest & Woodland Division

\*Common (Translated Scientific) Name: Southeastern South American Warm Temperate Forest & Woodland Division

\*Colloquial Name: Southeastern South American Warm Temperate Forest & Woodland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M654 | Espinal Deciduous Forest & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.1.Eg. Southeastern South American Warm Temperate Forest & Woodland

M654. Espinal Deciduous Forest & Woodland

Type Concept Sentence: Xeromorphic forests or woodlands of the Espinal biogeographic province in Argentina, located west of the pampas. These are open forests with three clear strata: canopy, shrub, and herbaceous. They develop on flat plains with coarse-textured soils, and are susceptible to wind erosion. The dominant species is *Prosopis caldenia*; other species are *Aspidosperma quebracho-blanco, Condalia microphylla, Geoffroea decorticans, Jodina rhombifolia, Larrea tridentata, Lycium chilense, Prosopis alpataco, Prosopis nigra, Schinus fasciculata, Senna aphylla*, and *Ximenia americana*. The understory includes the cacti *Cereus aethiops, Opuntia megapotamica, Opuntia sulphurea var. pampeana*, and grasses such as *Elionurus muticus, Jarava ichu, Nassella tenuis*, and *Setaria globulifera*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.1.Eg. Southeastern South American Warm Temperate Forest & Woodland (D240)

Elcode: M654

\*Scientific Name: Espinal Deciduous Forest & Woodland Macrogroup

\*Common (Translated Scientific) Name: Espinal Deciduous Forest & Woodland Macrogroup

\*Colloquial Name: Espinal Deciduous Forest & Woodland

\*Type Concept: This macrogroup represents xeromorphic forests or woodlands distributed in the biogeographic province known as Espinal in Argentina, which surrounds the Argentinian pampas to the west, limiting with the dry, psammophilous variation of these grasslands. These are open forests with three clear strata: canopy, shrub and herbaceous. They develop on rather flat plains with coarse-textured, poorly developed soils (Entisols and Mollisols) susceptible to wind erosion. The dominant species is *Prosopis caldenia* and accompanying species are *Aspidosperma quebracho-blanco, Condalia microphylla, Ephedra ochreata, Ephedra triandra, Geoffroea decorticans, Jodina rhombifolia, Larrea tridentata (= Larrea divaricata), Lycium chilense, Prosopis alpataco, Prosopis flexuosa, Prosopis nigra, Schinus fasciculata, Senna aphylla*, and *Ximenia americana*, with cacti *Cereus aethiops, Opuntia megapotamica*, and *Opuntia sulphurea var. pampeana* in the understory, and grasses such as *Elionurus muticus, Jarava ichu (= Stipa gynerioides), Nassella tenuis (= Stipa tenuis), Nassella tenuissima (= Stipa tenuissima), Poa lanuginosa, Poa ligularis, Prosopanche americana, Setaria globulifera, Setaria mendocina*, among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.1.Na. Southeastern North American Forest & Woodland

D006. Southeastern North American Forest & Woodland

Type Concept Sentence: This mixed broadleaf evergreen (oak, magnolia) and pine (longleaf) forest and woodlands occur in the southeastern U.S. Coastal Plain from southern Virginia, south to Florida and west to east Texas.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.1.Na. Warm Temperate Forest & Woodland (F018)

Elcode: D006

\*Scientific Name: *Pinus palustris - Quercus hemisphaerica - Magnolia grandiflora* Forest & Woodland Division

\*Common (Translated Scientific) Name: Longleaf Pine - Darlington Oak - Southern Magnolia Forest & Woodland Division

\*Colloquial Name: Southeastern North American Forest & Woodland

\*Type Concept: This mixed broadleaf evergreen and pine forest and woodland type occurs in the southeastern U.S. Coastal Plain from southern Virginia, south to Florida and west to east Texas. It varies from dry to moist open pine woodlands to mesic, fire-protected broadleaf evergreen forests. The xeric to moist pine woodlands are typically dominated by *Pinus palustris*. The driest examples include both sand barrens or scrub dominated by *Pinus palustris* or *Pinus clausa* and xeric longleaf pine-dominated woodlands dominated by *Pinus palustris* with understories of *Quercus incana, Quercus laevis*, and/or *Quercus margarettae*. Mesic longleaf pine flatwoods have an open canopy of *Pinus palustris* with a grass-dominated ground layer, and a high diversity of forbs. Wet and mesic longleaf pine savannas and flatwoods have open canopies of *Pinus palustris* with or without other pines such as *Pinus elliottii var. elliottii, Pinus serotina*, or *Pinus taeda*. In contrast to the pine woodlands, the dry-mesic hardwood woodlands and forests are primarily evergreen broadleaf forests dominated by *Quercus virginiana* and/or *Quercus hemisphaerica*, or various combinations of *Quercus fusiformis, Quercus geminata, Quercus hemisphaerica*, and/or *Quercus virginiana*. Mesic mixed evergreen broad-leaved forests occur on slopes, bluffs, or sheltered ravines where fire is naturally rare. Stands typically contain *Magnolia grandiflora*, within its range, as well as *Acer floridanum, Acer rubrum, Carya* spp., *Fagus grandifolia, Fraxinus americana, Liquidambar styraciflua, Liriodendron tulipifera, Magnolia acuminata, Magnolia macrophylla, Magnolia pyramidata, Magnolia tripetala* (these four occur in scattered areas in the coastal plain), Nyssa sylvatica, Pinus glabra (east of the Mississippi River), and *Quercus alba*. Ruderal forests may occur on former agricultural sites or sites repeatedly logged. Succession to a ruderal type may be favored by a lack of fire, which favors fire-intolerant and exotic species. Some typical ruderal species include the native conifers *Pinus clausa, Pinus elliottii*, and *Pinus taeda*, the native hardwoods *Acer rubrum var. rubrum, Catalpa bignonioides, Catalpa speciosa, Celtis laevigata, Liquidambar styraciflua, Maclura pomifera, Quercus hemisphaerica, Quercus nigra*, and the exotics *Albizia julibrissin, Broussonetia papyrifera, Quercus acutissima*, and *Triadica sebifera*.

The Southeastern Coastal Plain extends from the fall-line to the edge of the continental shelf, and is composed of alluvial and marine sediments. Much of the sediment, particularly at the surface, is siliceous alluvium, along with carbonaceous sediment. Common soil orders include sandy Entisols, Inceptisols, and Ultisols. The near-coastal maritime examples are affected by coastal processes, and are prone to salt spray effects and storm surge from major hurricanes. The climate of the coastal plain is humid subtropical, also referred to as warm-temperate, with mean daily temperatures between 0° and 18°C in the coldest month and >22°C in the warmest month. Rainfall is distributed evenly throughout the year, and averages about 100 to 135 cm (40-55 cm a year). This region has the highest frequency of lightning strikes of any region in North America, leading to frequent fires.

\*Diagnostic Characteristics: The tree canopy is between 10-80+% cover, and dominated by a mix of needleleaf conifers, broadleaf evergreens and broadleaf deciduous trees. Strong diagnostics include the pines *Pinus palustris, Pinus clausa, Pinus elliottii var. elliottii, Pinus glabra* (east of the Mississippi River), *Pinus serotina*, the oaks *Quercus incana, Quercus laevis, Quercus margarettae, Quercus virginiana* and/or *Quercus hemisphaerica, Quercus fusiformis*, or *Quercus geminata*, as well as other hardwoods, especially *Magnolia grandiflora* (within its range). Moderate to weak diagnostics (but common dominants) include *Acer floridanum, Acer rubrum, Carya* spp., *Fagus grandifolia, Fraxinus americana, Liriodendron tulipifera, Liquidambar styraciflua, Magnolia acuminata, Magnolia macrophylla, Magnolia pyramidata, Magnolia tripetala* (these four *Magnolia* spp. occur in scattered areas in the coastal plain), *Nyssa sylvatica*, and *Quercus alba*. Diagnostic exotics include *Albizia julibrissin, Broussonetia papyrifera, Quercus acutissima*, and *Triadica sebifera*.

\*Classification Comments: Distribution northward in Maryland, Kentucky and Missouri needs review.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D060 | Madrean-Balconian Forest & Woodland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The structure varies from very open, fire-dependent pine woodland, with as little as 10% canopy cover to mesic, fire-protected broadleaf evergreen forests with closed canopies with >80% cover. Xeric stands may have a scrubby 5-m tall tree canopy. The most open stands (10-30% cover) are sometimes referred to as savannas. The ground layer varies from open grass or scrub in pine woodlands to dense shrub/herb layers in mesic conditions.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The xeric to moist pine woodlands are typically dominated by *Pinus palustris*. The driest examples include scrub woodlands dominated by *Pinus palustris* or *Pinus clausa*, and taller, longleaf pine-dominated woodlands dominated by *Pinus palustris* with understories of *Quercus incana, Quercus laevis*, and/or *Quercus margarettae*. Mesic longleaf pine flatwoods have an open canopy of *Pinus palustris* with a grass-dominated ground layer and a high diversity of forbs. Wet and mesic longleaf pine savannas and flatwoods have open canopies of *Pinus palustris* with or without other pines such as *Pinus elliottii var. elliottii, Pinus serotina*, or *Pinus taeda*. In contrast to the pine woodlands, the dry-mesic hardwood woodlands and forests are primarily evergreen broadleaf forests dominated by *Quercus virginiana* and/or *Quercus hemisphaerica*, or various combinations of *Quercus fusiformis, Quercus geminata, Quercus hemisphaerica*, and/or *Quercus virginiana*. Mesic stands typically contain *Magnolia grandiflora*, within its range, as well as *Acer floridanum (= Acer barbatum), Acer rubrum, Carya* spp., *Fagus grandifolia, Fraxinus americana, Liquidambar styraciflua, Liriodendron tulipifera, Magnolia acuminata, Magnolia macrophylla, Magnolia pyramidata, Magnolia tripetala* (these four occur in scattered areas in the coastal plain), Nyssa sylvatica, Pinus glabra (east of the Mississippi River), and *Quercus alba*. Ruderal forests may occur on former agricultural sites or sites repeatedly logged. Succession to a ruderal type may be favored by a lack of fire, which favors fire-intolerant and exotic species. Some typical ruderal species include the native conifers *Pinus clausa, Pinus elliottii*, and *Pinus taeda*, the native hardwoods *Acer rubrum var. rubrum, Catalpa bignonioides, Catalpa speciosa, Celtis laevigata, Liquidambar styraciflua, Maclura pomifera, Quercus hemisphaerica, Quercus nigra*, and the exotics *Albizia julibrissin, Broussonetia papyrifera, Quercus acutissima*, and *Triadica sebifera (= Sapium sebiferum)*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Dynamics vary from dry to moist sites. Exposure to frequent, low-intensity surface fires is the dominant natural ecological process structuring the physiognomy of longleaf pine woodlands, influencing the local biodiversity. The absence of fire for only a few years may dramatically alter the physiognomy and composition of the lower strata, with understory hardwoods and shrubs crowding out the grasses and forbs. Maritime *Quercus virginiana*-dominated examples are influenced by coastal processes. Coastal erosion and accretion cause shifting of coastal landforms. Hurricanes and other storms can knock down large areas of coastal forests, and the influence of salt spray limits the plants that can survive along the coast. Mesic broadleaf forests, which often occur in ravines and on slopes near rivers or creeks, are naturally protected from wildland fire. Here, wind and heavy rain from hurricanes can cause canopy gaps where trees are toppled or broken.

*Biogeography:* The late Pleistocene studies of these forests show that during the Altonian sub-age of the Wisconsian (40,000 BP), there was forest vegetation similar to today's forest vegetation across a broad band extending from the coast of Georgia across the Mississippi embayment and into east Texas. With the drop in sea levels, the coastal plain extended east and south into what is now ocean. Through the remainder of the Wisconsinan, this band shifted in relation to the changing ice mass to the north. Although not located in a single refuge, many constituents of the mixed mesophytic forest could be found in scattered habitats in the Southeast. Sea levels returned to near their current position by 5000 to 3500 year BP (Christensen 2000 and references therein).

ENVIRONMENT

Environmental Description: *Climate:* According to the Köppen classification, the climate of the Southeastern Coastal Plain is humid subtropical, also referred to as warm-temperate. Mean daily temperatures are between 0° and 18°C in the coldest month and >22°C in the warmest month. Rainfall is distributed evenly throughout the year, and averages about 100 to 135 cm (40-55 cm a year). Although annual precipitation exceeds potential evapotranspiration throughout most of the year, summer dry periods may occur. In addition, this region has the highest frequency of lighting strikes of any region in North America, leading to frequent fires (Christensen 2000 and references therein).

*Soils/Substrate:* The forests of this division are on the Southeastern Coastal Plain, which extends from the fall-line to the edge of the continental shelf, and is composed of alluvial and marine sediments. Much of the sediment, particularly at the surface, is siliceous alluvium, along with carbonaceous sediment. These sediments have been reworked considerably by coastal and fluvial processes during the last 2-3 million years. Common soil orders include sandy Entisols (soils with virtually no profile development), Inceptisols (soils with weakly developed horizons) on alluvial plains, and Ultisols (highly weathered soils with a B horizon that contains translocated clays) (Christensen 2000 and references therein). The near-coastal maritime examples are affected by coastal processes, and are prone to salt spray effects and storm surge from major hurricanes.

DISTRIBUTION

\*Geographic Range: This type occurs in the coastal plain from Maryland and southern Virginia, south to Florida and west to east Texas.

Nations: US

States/Provinces: AL, AR, DE?, FL, GA, KY?, LA, MD, MO?, MS, NC, SC, TN, TX, VA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M007 | Longleaf Pine Woodland |
| M885 | Southeastern Coastal Plain Evergreen Oak - Mixed Hardwood Forest |
| M008 | Southern Mesic Mixed Broadleaf Forest |
| M305 | Southeastern North American Ruderal Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Deciduous Dicotyledonous - Evergreen Dicotyledonous - Coniferous Forest | Greller 1989 | This type and Temperate Broadleaved Evergreen Forest largely equate to this division concept. |
| < | Live Oak - Sea Oats (90) | Küchler 1964 | The maritime forests. |
| < | Maritime Vegetation Gradients / Maritime Forest | Christensen 2000 | This type and two other types equate to this division. Christensen (p. 430) briefly notes this type. |
| < | Sand Pine Scrub (115) | Küchler 1964 | Küchler's type may also include the scrub/shrub types, which are excluded here. |
| = | Southeastern Deciduous and Evergreen Forest | Brown et al. 1998 | Very similar mapped concept. |
| < | Southern Mixed Forest (112) | Küchler 1964 | This type is largely equivalent to this division, but see also Küchler's Live Oak - Sea Oats type. |
| = | Southern Mixed Hardwood Forest | Greller 2013 | Largely equivalent. |
| < | Temperate Broadleaved Evergreen Forest | Greller 1989 | This type and Deciduous Dicotyledonous - Evergreen Dicotyledonous - Coniferous Forest largely equate to this division concept. |
| < | Upland Hardwood Forest | Christensen 2000 | This type and two other types equate to this division. See p. 416ff. |
| < | Upland Pine Forest Vegetation | Christensen 2000 | This type and two other types equate to this division. See p. 402. Christensen also includes New Jersey Pine Barrens, which we treat elsewhere, with G161/M502. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Faber-Langendoen

Acknowledgments [optional]: M. Pyne, C. Nordman and R.K. Peet, for materials taken from macrogroup descriptions.

Version Date: 30 Jan 2015

REFERENCES

\*References [Required if used in text]:

Braun, E. L. 1950. Deciduous forests of eastern North America. Hafner Press, New York. 596 pp.

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Christensen, N. L. 2000. Vegetation of the Southeastern Coastal Plain. Pages 398-448 in: M. G. Barbour and W. D. Billings, editors. North American terrestrial vegetation. Second edition. Cambridge University Press, New York. 434 pp.

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1. Forest & Woodland

1.B.1.Na. Southeastern North American Forest & Woodland

M885. Southeastern Coastal Plain Evergreen Oak - Mixed Hardwood Forest

Type Concept Sentence: These are primarily evergreen broadleaf forests, dominated by evergreen *Quercus* spp. (*Quercus virginiana, Quercus hemisphaerica*), and are found both along the coast and inland in the Southeastern Coastal Plain from North Carolina south and west to Texas.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.1.Na. Southeastern North American Forest & Woodland (D006)

Elcode: M885

\*Scientific Name: *Quercus virginiana - Quercus fusiformis - Quercus hemisphaerica* Forest Macrogroup

\*Common (Translated Scientific) Name: Live Oak - Texas Live Oak - Darlington Oak Forest Macrogroup

\*Colloquial Name: Southeastern Coastal Plain Evergreen Oak - Mixed Hardwood Forest

\*Type Concept: This macrogroup accommodates primarily evergreen broadleaf forests of the coastal plains of the southeastern United States from North Carolina south and west to Texas. Stands are dominated by *Quercus virginiana* and/or *Quercus hemisphaerica*, found from North Carolina south into Florida and west to Mississippi, as well as stands dominated by various combinations of *Quercus fusiformis, Quercus geminata, Quercus hemisphaerica*, and/or *Quercus virginiana*, the particular combinations varying with geography, found from North Carolina to Florida and along the Gulf of Mexico coast from Florida to Texas. The near-coastal maritime examples are affected by coastal processes, and are prone to salt spray effects and storm surge from major hurricanes. The inland examples tend to occur on upper to mid slopes, but occasionally on broader uplands with reduced fire frequencies.

\*Diagnostic Characteristics: In the coastal plains, the various regionally variable combinations of *Quercus fusiformis, Quercus geminata, Quercus hemisphaerica*, and/or *Quercus virginiana* are diagnostic. For the maritime coastal examples of this macrogroup, *Quercus virginiana* is a strong diagnostic species. Pines, particularly *Pinus taeda*, may be present but are not diagnostic for this type.

\*Classification Comments: According to Nixon and Muller (1997), all "live oaks" of coastal Texas southwest of the Brazos are considered *Quercus fusiformis*, although these are likely introgressed with *Quercus virginiana* and/or the Mexican species *Quercus oleoides*.

There is vegetation that appears similar to this macrogroup but is found within the range of longleaf pine. Marks and Harcombe (1981) address this issue in relation to vegetation of the Big Thicket region of Texas, within the range of longleaf pine. Their "Upper Slope Pine Oak Forest" may represent successional vegetation which has developed under longer fire-return intervals on portions of the landscape which would have historically been occupied by longleaf pine-dominated vegetation if fire had been more frequent. In contrast, their "Mid Slope Oak Pine Forest" may actually represent examples of this vegetation macrogroup which occur adjacent to longleaf pine-dominated uplands, but which are found on lower slopes where fire is infrequent enough that longleaf pine is absent. More investigation of this question is needed.

Lee Elliott (pers. comm.) suggests that the *Quercus fusiformis* types of south Texas may be more closely related to Tamaulipan vegetation (*Prosopis, Colubrina, Celtis ehrenbergiana*) and that there is a need to recognize the relationship of these live oaks to *Quercus oleoides* of Mexico.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M008 | Southern Mesic Mixed Broadleaf Forest |  |
| M016 | Southern & South-Central Oak - Pine Forest & Woodland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: These are typically predominantly evergreen broadleaf or mixed evergreen-deciduous forests. *Quercus virginiana* stands are generally short-statured forests, where exposure to the wind and salt spray along the shore can impart a dwarfed and sculpted shape to the vegetation. Broadleaf evergreen shrubs are common and herbaceous plants are usually sparse.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: These are primarily evergreen forests of the coastal plains of the southeastern United States. From North Carolina west to Texas, these are forests dominated by evergreen *Quercus* spp., including broadleaf evergreen forests dominated by *Quercus hemisphaerica*, found from North Carolina south into Florida and west to Mississippi, as well as stands primarily dominated by *Quercus fusiformis, Quercus geminata, Quercus hemisphaerica*, and/or *Quercus virginiana*, found from North Carolina to Florida and along the Gulf of Mexico coast from Florida to Texas. In these forests, a wide variety of broadleaf evergreen shrubs are present, but the herbaceous cover is usually sparse. There is regional variation, both from north to south, and among coastward and landward examples. In Louisiana, *Celtis laevigata* may be a common canopy tree. Other canopy trees can include *Carya glabra, Carya pallida, Diospyros virginiana, Magnolia grandiflora, Pinus* spp., *Quercus nigra*, and *Sabal palmetto*. Understory trees and shrubs may include *Callicarpa americana, Conradina canescens, Erythrina herbacea, Ilex glabra, Ilex vomitoria, Juniperus virginiana var. silicicola, Morella cerifera, Persea borbonia, Persea palustris, Quercus chapmanii, Quercus geminata, Quercus myrtifolia, Serenoa repens, Sideroxylon* spp., *Vaccinium arboreum*, and *Zanthoxylum clava-herculis*. Vines can include *Parthenocissus quinquefolia, Smilax* spp., *Toxicodendron radicans*, and *Vitis* spp. Herbaceous plants are usually sparse and include *Chasmanthium* spp., *Dichanthelium* spp., *Mitchella repens, Panicum virgatum, Paspalum* spp., and *Scleria triglomerata*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Maritime *Quercus virginiana*-dominated examples are influenced by coastal processes. Coastal erosion and accretion cause shifting of coastal landforms. Hurricanes and other storms can knock down large areas of coastal forests, and the influence of salt spray limits the plants that can survive along the coast. Related more Inland examples occur in patches called hammocks, mottes, or cheniers. In Florida, lower frequency of growing-season fires apparently has contributed to the increased size and number of xeric hammocks (Myers 1990a). This oak hammock vegetation occurs as patches within the longleaf pine ecosystem. The litter of the broadleaf evergreen trees that dominate this vegetation does not readily burn, so fires that burn the surrounding longleaf pine habitats will generally not burn the hammocks.

ENVIRONMENT

Environmental Description: In the Atlantic Coastal Plain, these forests may occur in inland locations, as well as on barrier islands. Inland examples tend to occur on upper to mid slopes, but occasionally on broader uplands with reduced fire frequencies. A range of soils may be present from loamy and clayey to coarse sands, but soils are generally well-drained but not excessively drained. Soils are generally acidic, though calcareous soils occur occasionally. Sites are somewhat protected from most natural fires by steep topography and by limited flammability of the vegetation. Fires that penetrate these forests are generally low in intensity and have fairly limited ecological effect. Maritime forest examples are found on stabilized dunes and other related landforms composed of reworked well-drained coastal sands, which can be deep (>130 cm) (Drew et al. 1998). In Georgia, more mesic examples have relatively thin soils (to 50 cm) above clay. Topography varies from larger dunes to smaller ridges and swales, upland flat areas, salt domes, or coastal ridges called cheniers (in Louisiana). On the Atlantic Coast, these forests occur on the southeast coast of North Carolina and on the Sea Islands, a chain of low islands along the coast of South Carolina, Georgia, and northern Florida, from the Cooper River to the St. Johns River. The climate is warm-temperate and humid. Coastal hurricanes and other storms can be an important influence on this vegetation. Where these forests occur along the coast, they are prone to salt spray and storm surge from major hurricanes.

DISTRIBUTION

\*Geographic Range: These predominantly evergreen broadleaf forests are found in the coastal plains of the southeastern United States from North Carolina south into Florida and eastern Texas.

Nations: MX?, US

States/Provinces: AL, FL, GA, LA, MS, NC, SC, TX

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G798 | Coastal Live Oak - Hickory - Palmetto Forest |
| G790 | Southern Evergreen Oak Forest |
| G799 | Texas Live Oak - Wax Mallow Motte & Coastal Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-11-06 | M157 Quercus hemisphaerica - Quercus virginiana - Pinus taeda Subxeric Forest Macrogroup | M157 replaced by M885 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: R.K. Peet, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by Judy Teague and Carl Nordman.

Version Date: 25 Nov 2014

REFERENCES

\*References [Required if used in text]:

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1.B.2. Cool Temperate Forest & Woodland

Cool Temperate Forest & Woodland includes temperate deciduous forest and woodland, temperate needle-leaved forest and woodland, and temperate rainforest, dominated by broad-leaved or needle-leaved tree growth forms.

1. Forest & Woodland

1.B.2.Ee. Valdivian Cool Temperate Forest

D241. Valdivian Cool Temperate Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.2.Ee. Cool Temperate Forest & Woodland (F008)

Elcode: D241

\*Scientific Name: Valdivian Cool Temperate Forest Division

\*Common (Translated Scientific) Name: Valdivian Cool Temperate Forest Division

\*Colloquial Name: Valdivian Cool Temperate Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M656 | Valdivian Lower Montane Deciduous Forest |
| M655 | Valdivian Lower Montane Evergreen Forest |
| M657 | Valdivian Montane & Upper Montane Deciduous Forest |
| M658 | Valdivian Montane & Upper Montane Evergreen Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.2.Ee. Valdivian Cool Temperate Forest

M656. Valdivian Lower Montane Deciduous Forest

Type Concept Sentence: *Nothofagus*-dominated deciduous forests of the western slopes of the Chilean Andes in the Bio-Bio and Araucania regions (including the coastal range in these regions), occurring at elevations of 600-1200 m. Dominated by *Nothofagus alpina, Nothofagus obliqua*, and *Nothofagus dombeyi*, or accompanied by *Nothofagus glauca* and *Prumnopitys andina* in restricted locations. In coastal range forests where the climate is very humid due to the oceanic influence, evergreen shrubs and small trees such as *Dasyphyllum diacanthoides, Desfontainia spinosa, Gevuina avellana, Maytenus magellanica, Myrceugenia ovata*, and *Persea lingue* dominate the understory. On drier Andean slopes, subcanopy strata are formed by *Sophora macrocarpa* and sclerophyllous species such as *Azara petiolaris, Caryptocarya alba, Lithrea caustica*, and *Quillaja saponaria*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Ee. Valdivian Cool Temperate Forest (D241)

Elcode: M656

\*Scientific Name: Valdivian Lower Montane Deciduous Forest Macrogroup

\*Common (Translated Scientific) Name: Valdivian Lower Montane Deciduous Forest Macrogroup

\*Colloquial Name: Valdivian Lower Montane Deciduous Forest

\*Type Concept: The macrogroup includes *Nothofagus*-dominated deciduous forest of the western slopes of the Chilean Andes of the Bio-Bio and Araucania regions as well as the Nahuebuta coastal range in the same regions, growing between approximately 600-1200 m elevation. These are forests dominated by *Nothofagus alpina, Nothofagus obliqua*, and *Nothofagus dombeyi* in some locations, or accompanied by *Nothofagus glauca* and *Prumnopitys andina* in other restricted locations. In the case of the coastal cordillera occurrences, which have a hyper-humid climate due to the oceanic influence, the understory is dominated by the evergreen shrubs and small trees *Gevuina avellana, Persea lingue, Dasyphyllum diacanthoides, Desfontainia spinosa, Gavilea araucana, Lomatia dentata, Maytenus magellanica, Myrceugenia ovata, Ribes integrifolium*, among others. In the drier Andean slopes occurrences, the subcanopy strata are formed by *Lomatia dentata, Sophora macrocarpa*, and sclerophyllous elements such as *Azara petiolaris, Caryptocarya alba, Lithrea caustica*, and *Quillaja saponaria*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.2.Ee. Valdivian Cool Temperate Forest

M655. Valdivian Lower Montane Evergreen Forest

Type Concept Sentence: Mixed evergreen and deciduous forests that occur in the western foothills of the Coastal Cordillera (Nahuelbuta) and intermontane valleys of south temperate Chile in sites between the dominant *Nothofagus obliqua* deciduous forests and lakeshores. These forests are tall, dense and mixed evergreen-deciduous, with canopies 25-30 m high. They are rich in epiphytes and vines, usually with *Nothofagus obliqua* and the lauroid species *Aextoxicon punctatum, Eucryphia cordifolia, Eugenia apiculata, Laurelia sempervirens, Laureliopsis philippiana, Podocarpus saligna*, and *Weinmannia trichosperma*. In some cases, *Nothofagus dombeyi* is a significant component of the canopy, and *Chusquea quila* is common in the understory.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Ee. Valdivian Cool Temperate Forest (D241)

Elcode: M655

\*Scientific Name: Valdivian Lower Montane Evergreen Forest Macrogroup

\*Common (Translated Scientific) Name: Valdivian Lower Montane Evergreen Forest Macrogroup

\*Colloquial Name: Valdivian Lower Montane Evergreen Forest

\*Type Concept: This macrogroup represents communities of mixed evergreen and deciduous species that occur in the western foothills of the Coastal Cordillera (Nahuelbuta) and intermontane valley locations of temperate southern Chile, in the lake region in sites between the dominant *Nothofagus obliqua* deciduous forests and the waterbodies. In general these are tall, dense and mixed evergreen-deciduous forests, with a canopy 25-30 m high, rich in epiphytes and vines, usually dominated by *Nothofagus obliqua* with the lauroid species *Laurelia sempervirens, Laureliopsis philippiana, Weinmannia trichosperma, Aextoxicon punctatum, Eugenia apiculata (= Luma apiculata), Podocarpus saligna*, and *Eucryphia cordifolia*. In some cases *Nothofagus dombeyi* has a significant cover, as well as *Chusquea quila* in the understory.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR?, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.2.Ee. Valdivian Cool Temperate Forest

M657. Valdivian Montane & Upper Montane Deciduous Forest

Type Concept Sentence: Deciduous forests growing between 1000 and 1600 m elevation in the montane and upper montane belts of the southern Andes in Chile and Argentina. These are deciduous and microphyllous forests with a dense canopy up to 30-40 m tall, dominated by *Nothofagus pumilio*, accompanied by numerous evergreen lauroid species. They develop on deep and well-drained soils in humid to hyper-humid climatic conditions in these latitudes. Diagnostic species are *Adenocaulon chilense, Alstroemeria aurea, Berberis* spp., *Codonorchis lessonii, Drimys andina, Empetrum rubrum, Gunnera magellanica, Maytenus magellanica, Nothofagus betuloides, Nothofagus pumilio, Ribes cucullatum, Rubus geodes*, and *Viola maculata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Ee. Valdivian Cool Temperate Forest (D241)

Elcode: M657

\*Scientific Name: Valdivian Montane & Upper Montane Deciduous Forest Macrogroup

\*Common (Translated Scientific) Name: Valdivian Montane & Upper Montane Deciduous Forest Macrogroup

\*Colloquial Name: Valdivian Montane & Upper Montane Deciduous Forest

\*Type Concept: The macrogroup represents the deciduous forests growing between 1000-1600 m elevation of the montane and upper montane belts of the southern Andes in Chile and Argentina. These are deciduous and microphyllous forests with a dense canopy up to 30-40 m tall, dominated by *Nothofagus pumilio* (lenga ), accompanied by numerous evergreen lauroid species. They constitute the potential vegetation that develops on deep and well-drained soils in humid to hyper-humid climatic conditions in these latitudes. Diagnostic species are *Nothofagus pumilio, Nothofagus betuloides, Drimys andina, Maytenus magellanica, Empetrum eamesii (= Empetrum rubrum), Ribes cucullatum, Valeriana lapathifolia, Codonorchis lessonii, Adenocaulon chilense, Rubus geodes, Berberis* spp., *Gunnera magellanica, Viola maculata, Viola reichei*, and *Alstroemeria aurea (= Alstroemeria aurantiaca)*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.2.Ee. Valdivian Cool Temperate Forest

M658. Valdivian Montane & Upper Montane Evergreen Forest

Type Concept Sentence: Several types of temperate forests in the southern Andes dominated by either coniferous or evergreen species, mixed with deciduous species. The Chilean *Araucaria araucana* forest, distributed from 800-1600 m elevation, has a deciduous subcanopy dominated by *Nothofagus dombeyi* or *Nothofagus pumilio*. Another type is the *Austrocedrus chilensis - Nothofagus dombeyi* forest. It occurs in subhumid localities (especially in Argentina) between 800-1100 m. A third type is the tall *Fitzroya cupressoides* forest of the hyper-humid coastal ranges and Andean slopes of southern Chile. Associated species of this type include *Nothofagus nitida, Nothofagus betuloides*, and *Podocarpus nubigenus*. A fourth type are the diverse Valdivian evergreen forests growing under hyper-humid conditions of the coastal and Andes cordilleras between 800-1200 m.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Ee. Valdivian Cool Temperate Forest (D241)

Elcode: M658

\*Scientific Name: Valdivian Montane & Upper Montane Evergreen Forest Macrogroup

\*Common (Translated Scientific) Name: Valdivian Montane & Upper Montane Evergreen Forest Macrogroup

\*Colloquial Name: Valdivian Montane & Upper Montane Evergreen Forest

\*Type Concept: This macrogroup includes various types of temperate forests which have in common the dominance of either coniferous or evergreen species, in both cases mixed with deciduous species, and are distributed in the southern Andes. Some types occur in Argentina and Chile, but others are restricted to Chile. The *Araucaria araucana* forest, distributed from 800-1600 m elevation, is characterized by an emergent canopy of this conifer with a deciduous subcanopy stratum of *Nothofagus dombeyi* or *Nothofagus pumilio*. In the understory is frequently the presence of *Chusquea culeou*, which can completely cover the ground in some situations. The basal stratum is usually dense and is composed of juveniles of the dominant tree species and by a diverse assemblage of other shrubs and herbaceous species such as *Pseudopanax laetevirens, Drimys andina, Adenocaulon chilense*, and *Lagenophora hirsuta*. In some situations *Araucaria araucana* forms a shorter and very open canopy with a well-developed layer of graminoids such as *Festuca scabriuscula* and *Poa trigtismatica*. Another type included is the *Austrocedrus chilensis* forest, dominated by this conifer and by *Nothofagus dombeyi* in the upper canopy. This forest occurs in sub-humid localities of the southern Andes and therefore with larger extensions on the Argentinian side in the Neuquen and Rio Negro provinces between 800-1100 m elevation. Another coniferous forest included in this macrogroup is the tall *Fitzroya cupressoides* forest (alerce), distributed from 800-1200 m elevation in the hyper-humid slopes of the coastal ranges and Andean slopes of southern Chile. Associated species of this forest are *Nothofagus nitida, Nothofagus betuloides*, and *Podocarpus nubigenus* in the canopy stratum and *Gevuina avellana, Chusquea macrostachya, Drimys andina*, and *Embothrium coccineum* in the understory. The last group included here are the highly diverse (Valdivian) evergreen forests distributed in southern Chile under hyper-humid conditions of the coastal and Andes cordillera between 800-1200 m asl. It is a multi-stratified forest, 30-40 m high, rich in epiphytes and lianas, growing on mostly drained but highly humic soils. Diagnostic species are *Weinmannia trichosperma, Chrysosplenium valdivianum, Luzuriaga radicans, Podocarpus nubigenus, Laureliopsis philippiana, Saxegothea conspicua, Drimys winteri, Nothofagus dombeyi, Nothofagus nitida, Campsidium valdivianum, Philesia magellanica, Pseudopanax laetevirens, Elytropus chilensis, Amomyrtus luma*, and *Myrceugenia exsucca*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.2.Ef. Magellanian Cool Temperate Forest

D242. Magellanian Cool Temperate Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.2.Ef. Cool Temperate Forest & Woodland (F008)

Elcode: D242

\*Scientific Name: Magellanian Cool Temperate Forest Division

\*Common (Translated Scientific) Name: Magellanian Cool Temperate Forest Division

\*Colloquial Name: Magellanian Cool Temperate Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M659 | Magellanian Temperate Evergreen Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.2.Ef. Magellanian Cool Temperate Forest

M659. Magellanian Temperate Evergreen Forest

Type Concept Sentence: Austral Magellanian forests that are usually dominated by *Nothofagus betuloides*, with canopy heights of 8-15 m. These are very dense and humid with a subcanopy of small trees and shrubs, rich in epiphytes. Occurrences with a western aspect, influenced by the moisture and rains of oceanic origin, have a lower stratum consisting of waterlogged mats of bryophytes and lichens that cover the forest floor and form mounds up to 2 m in height and capable of creeping 4-5 m up tree trunks. The diagnostic species are *Chusquea macrostachya, Desfontainia spinosa, Drimys winteri, Luzuriaga marginata, Maytenus magellanica, Mitraria coccinea, Nothofagus betuloides, Podocarpus nubigenus*, and *Saxegothea conspicua*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Ef. Magellanian Cool Temperate Forest (D242)

Elcode: M659

\*Scientific Name: Magellanian Temperate Evergreen Forest Macrogroup

\*Common (Translated Scientific) Name: Magellanian Temperate Evergreen Forest Macrogroup

\*Colloquial Name: Magellanian Temperate Evergreen Forest

\*Type Concept: This macrogroup represents the austral Magellanic forests, usually dominated by *Nothofagus betuloides*, with a canopy 8-15 m tall on average. These are very dense and humid forests with a subcanopy of small trees and shrubs, rich in epiphytes and a characteristic lower stratum consisting of a dense and waterlogged mass of bryophytes (mosses and liverworts) and lichens, completely covering the forest floor, forming mounds up to 2 m in height and creeping on tree trunks up to more than 4-5 m high. This description corresponds to occurrences with a western aspect, which are influenced by the moisture and rains of oceanic origin, while the eastern slopes do not have the cover of bryophytes and epiphytes. The diagnostic species are *Nothofagus betuloides, Mitraria coccinea, Maytenus magellanica, Desfontainia spinosa, Podocarpus nubigenus, Berberis ilicifolia, Saxegothea conspicua, Drimys winteri, Chusquea macrostachya, Luzuriaga marginata, Blechnum magellanicum*, among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.2.Na. Eastern North American Forest & Woodland

D008. Eastern North American Forest & Woodland

Type Concept Sentence: These eastern North American forests and woodlands are dominated by cold-deciduous broadleaf trees, sometimes mixed with conifers, with strong diagnostic tree species, including *Acer rubrum, Acer saccharum, Carya* spp. (especially *Carya cordiformis, Carya glabra, Carya ovata*), *Fagus grandifolia, Fraxinus americana, Liriodendron tulipifera, Quercus* spp. (especially *Quercus alba, Quercus rubra, Quercus velutina*), and *Tilia americana*.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.2.Na. Cool Temperate Forest & Woodland (F008)

Elcode: D008

\*Scientific Name: *Acer saccharum - Fagus grandifolia - Quercus rubra* Forest & Woodland Division

\*Common (Translated Scientific) Name: Sugar Maple - American Beech - Northern Red Oak Forest & Woodland Division

\*Colloquial Name: Eastern North American Forest & Woodland

\*Type Concept: These eastern North American forests and woodlands are dominated by cold-deciduous broadleaf trees, sometimes mixed with conifers. A number of strong diagnostic and dominant tree taxa include *Acer rubrum, Acer saccharum, Carya* spp. (especially *Carya cordiformis, Carya glabra, Carya ovata*), *Fagus grandifolia, Fraxinus americana, Liriodendron tulipifera, Quercus* spp. (especially *Quercus alba, Quercus rubra, Quercus velutina*), and *Tilia americana*. Widespread ruderal species found on human-disturbed sites and typically lacking the above species include the native species *Acer rubrum, Juglans nigra, Juniperus virginiana, Prunus serotina*, and *Robinia pseudoacacia*. Generally, the division is limited northward by the lack of tolerance of temperatures below -40°C, westward by increasingly dry conditions (roughly corresponding to precipitation/evapotranspiration ratio are <1 and annual rainfall is <60 to <100 cm, north to south, respectively) in combination with increasing fires, and southward by increasing warm conditions, when temperatures rarely fall below -10°C. The vegetation responds to a variety of site factors, along gradients of soil moisture, aspect and elevation, as these interact with disturbances of wind, fire and human land use. Many fertile sites have been cleared and plowed (then sometimes abandoned, providing a relatively novel biophysical template for ruderal forests), or repeatedly harvested over the last 200+ years.

\*Diagnostic Characteristics: This division contains a number of strong diagnostic tree taxa that broadly distinguish it from other divisions (key taxa are entirely or largely restricted to the division (diagnostic), widespread (constant), and frequently dominant). These include *Acer rubrum, Acer saccharum, Carya* spp. (especially *Carya cordiformis, Carya glabra, Carya ovata*), *Fagus grandifolia, Fraxinus americana, Liriodendron tulipifera, Quercus* spp. (especially *Quercus alba, Quercus rubra, Quercus velutina*), and *Tilia americana* (adapted from Delcourt and Delcourt 2000). The Great Plains woodlands are typified by *Populus tremuloides* and *Quercus macrocarpa*. Widespread ruderal species found on human-disturbed sites and typically lacking the above species include the native species *Acer rubrum, Juglans nigra, Juniperus virginiana, Prunus serotina*, and *Robinia pseudoacacia*. These taxa are entirely lacking from other North American cool-temperate forest divisions.

\*Classification Comments: The core concept of this division largely follows that of Braun (1950) and Greller (1989). Key differences are that Braun's (1950) Southeastern Evergreen Forest Region is excluded, as does Greller (1989) (Braun noted that "on a floristic basis, the Southeastern Evergreen Forest Region might well be excluded from the Deciduous Forest (p. 282)). But unlike Greller (1989), we follow Braun in retaining the "Hemlock-White Pine-Northern Hardwoods Region" within this division. Delcourt and Delcourt (2000) largely follow Lucy Braun's treatment.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D060 | Madrean-Balconian Forest & Woodland |  |
| D326 | North American Great Plains Forest & Woodland |  |
| D014 | North American Boreal Forest & Woodland |  |
| D023 | Central North American Grassland & Shrubland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Stands are dominated by cold-deciduous broadleaf trees, trending to mixed stands of hardwoods with evergreen conifers northward and southward, and with evergreen broadleaf trees, southward. The forest is typically multi-storied, with canopy trees commonly reaching heights of 25-40 m. The canopy may be shorter and contain a simple two-layer structure on drier sites or in drier climates of the Midwest and Great Plains, particularly where fire regimes play a larger role. Trees may live between 200 and 600 years. The shrub layer is typically cold-deciduous, at least for tall shrubs, with tall evergreen shrubs (such as *Rhododendron maximum*) increasing southward. The herb layer ranges from simple to diverse, often comprised of an array of spring ephemerals that are largely perennial (Delcourt and Delcourt 2000).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: A number of key tree taxa broadly distinguish this (key taxa are entirely or largely restricted to the division (diagnostic), widespread (constant), and frequently dominant). These include *Acer rubrum, Acer saccharum, Carya* spp. (especially *Carya cordiformis, Carya glabra, Carya ovata*), *Fagus grandifolia, Fraxinus americana, Liriodendron tulipifera, Quercus* spp. (especially *Quercus alba, Quercus rubra, Quercus velutina*), and *Tilia americana* (adapted from Delcourt and Delcourt 2000).

In addition to the above widespread species, the following species are moderately diagnostic of the division, and often strongly diagnostic within a component macrogroup (adapted from Greller 2013, Table 1). Laurentian-Acadian macrogroups (Hemlock-White Pine-Northern Hardwoods of Braun 1950): (hardwoods) *Acer pensylvanicum, Acer spicatum, Betula alleghaniensis*; also *Betula papyrifera, Populus grandidentata, Populus tremuloides*; (conifers) *Tsuga canadensis, Pinus strobus, Pinus resinosa, Picea rubens*. Appalachian macrogroups: *Aesculus flava, Amelanchier laevis, Carpinus caroliniana, Castanea dentata* (historically), *Cladrastis kentukea, Cornus florida, Halesia tetraptera, Liriodendron tulipifera, Magnolia acuminata, Magnolia fraseri, Magnolia tripetala, Quercus coccinea, Ostrya virginiana, Quercus alba, Quercus rubra, Ulmus rubra*. Midwest macrogroups: dominated by the division-level diagnostics, but rarely contain the moderate diagnostic species of other macrogroups. A moderate diagnostic includes *Quercus macrocarpa*. South-central macrogroup: *Acer floridanum (= Acer barbatum), Carpinus caroliniana, Cercis canadensis, Cornus florida, Juglans nigra, Liriodendron tulipifera, Magnolia acuminata, Ostrya virginiana, Ulmus rubra*; (mesoxeric) *Carya tomentosa, Liquidambar styraciflua, Nyssa sylvatica, Oxydendrum arboreum, Pinus echinata, Pinus taeda, Pinus virginiana, Quercus falcata, Quercus marilandica, Quercus stellata*. Widespread ruderal species found on human-disturbed sites and typically lacking the above species include the native species *Acer rubrum, Juglans nigra, Juniperus virginiana, Prunus serotina*, and *Robinia pseudoacacia*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: On mesic sites these forests and woodlands are characterized by long periods where large-scale catastrophic disturbances are rare to absent (500- to 1000-year intervals). Windthrow is the most common disturbance on these sites. Drier sites may experience greater fire disturbances. Native Americans influenced the vegetation, including through localized settlements, especially along riparian corridors and through fire over the last 10-15,000 years. Dynamics today are often shaped by land use and forest management practices. Many fertile sites have been cleared and plowed (then sometimes abandoned, providing a relatively novel biophysical template for ruderal forests), or repeatedly harvested over the last 200+ years (Delcourt and Delcourt 2000).

Biogeography: Floristically, eastern deciduous forests are most closely related to now widely disjunct temperate forests in Europe, Japan, and eastern China, with a common history that extends back to the Eocene Epoch of the Tertiary Period (65-35 M years ago). By the beginning of the late Miocene Epoch (10 M years ago), tectonic events disrupted the North Atlantic land bridge, isolating North America. Deciduous forests persisted in western North America until the Miocene (15-10 M years ago) (Delcourt and Delcourt 2000 and references therein). In the last 2 million years of the Quaternary Period, the glacial-interglacial cycles, with a periodicity of about 100,000 years, has led to a "disassembly" and "reassembly" of this division within Eastern North America. Delcourt and Delcourt (2000) estimate that the total area of this division has fluctuated from <600,000 km2 during glacial periods, to as much as 2,500,000 km2 in late interglacial periods, such as the current time.

ENVIRONMENT

Environmental Description: *Climate:* Generally, the division is limited northward by the lack of tolerance of temperatures below -40°C, westward by increasingly dry conditions (roughly corresponding to precipitation/evapotranspiration ratio are <1 and annual rainfall is <60 to <100 cm, north to south, respectively) in combination with increasing fires, and southward by increasing warm conditions, when temperatures rarely fall below -10°C. These factors reflect the major air masses that predominate across eastern North America: (1) polar or arctic air mass to the north, (2) the relatively dry Pacific air that loses moisture as it crosses the mountains and Great Plains, and (3) the moist, warm maritime tropical air mass originating over the Gulf of Mexico and Caribbean seas. *Soils:* The vegetation responds to a variety of site factors, along gradients of soil moisture, aspect and elevation, as these interact with disturbances of wind, fire and human land use (Delcourt and Delcourt 2000).

DISTRIBUTION

\*Geographic Range: These cool-temperate forests and woodlands extend from the temperate regions of Atlantic Canada west to Minnesota, south to the Piedmont of Georgia, and west to Texas.

Nations: CA, US

States/Provinces: AL, AR, CT, DC, DE, FL?, GA, IA, IL, IN, KS, KY, LA, MA, MB?, MD, ME, MI, MN, MO, MS, NB, NC, ND, NE, NF, NH, NJ, NS, NY, OH, OK, ON, PA, PE, QC, RI, SC, SD, TN, TX, VA, VT, WI, WV

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M016 | Southern & South-Central Oak - Pine Forest & Woodland |
| M502 | Appalachian-Northeastern Oak - Hardwood - Pine Forest & Woodland |
| M883 | Appalachian-Interior-Northeastern Mesic Forest |
| M012 | Central Midwest Oak Forest, Woodland & Savanna |
| M882 | Central Midwest Mesic Forest |
| M159 | Laurentian-Acadian Pine - Hardwood Forest & Woodland |
| M014 | Laurentian-Acadian Mesic Hardwood - Conifer Forest |
| M013 | Eastern North American Ruderal Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Deciduous Forest | Greller 1989 | Greller excludes Braun's (1950) Hemlock-White Pine-Northern Hardwoods Forest, equivalent to the Laurentian-Acadian forest macrogroups (M014 and M159). |
| = | Eastern Deciduous Forests | Delcourt and Delcourt 2000 | Approximately equivalent, they include Braun's (1950) Southeastern Evergreen Forest Region Forest, which we treat as a separate division (D006). |
| = | Northeastern Deciduous Forest | Brown et al. 1998 | Brown extends mapped concept into Great Plains. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: H.R. Delcourt and P.A. Delcourt (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 08 Jan 2016

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1. Forest & Woodland

1.B.2.Na. Eastern North American Forest & Woodland

M502. Appalachian-Northeastern Oak - Hardwood - Pine Forest & Woodland

Type Concept Sentence: This northeastern macrogroup comprises forests characterized by a number of dry-site oak species (*Quercus coccinea, Quercus falcata, Quercus muehlenbergii, Quercus montana, Quercus velutina*) and pine species (*Pinus pungens, Pinus rigida, Pinus virginiana*) occurring on substrates ranging from acidic to substrates of high base status.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Na. Eastern North American Forest & Woodland (D008)

Elcode: M502

\*Scientific Name: Appalachian-Northeastern Oak - Hardwood - Pine Forest & Woodland Macrogroup

\*Common (Translated Scientific) Name: Appalachian-Northeastern Oak - Hardwood - Pine Forest & Woodland Macrogroup

\*Colloquial Name: Appalachian-Northeastern Oak - Hardwood - Pine Forest & Woodland

\*Type Concept: This northeastern macrogroup comprises forests characterized by a number of dry-site oak and pine species occurring on a variety of well-drained substrates. Acidic parent materials of low fertility support forests dominated by *Quercus coccinea, Quercus falcata, Quercus muehlenbergii, Quercus montana, Quercus velutina*, as well as other hardwoods such as *Liriodendron tulipifera, Sassafras albidum*, and pines, including *Pinus rigida, Pinus pungens, Pinus strobus*, and *Pinus virginiana*, often overtopping a well-developed heath shrub layer comprising species of *Gaylussacia, Rhododendron, Vaccinium*, and others. Less acidic or high base status parent materials support many of the same oak species (*Quercus coccinea, Quercus falcata, Quercus muehlenbergii, Quercus montana, Quercus velutina*), in combination with a variety of hickory species (*Carya* spp.), *Betula alleghaniensis, Betula lenta*, and *Fagus grandifolia*. *Quercus muehlenbergii* is particularly characteristic of parent materials of higher base status. Vegetation of this macrogroup occurs on a variety of substrates, ranging from dry sandy soils supporting pine barrens and maritime scrub vegetation, to exposed bedrock and shale barrens.

\*Diagnostic Characteristics: Northeastern woodlands and forests with dominance by or importance of *Quercus coccinea, Quercus falcata, Quercus muehlenbergii, Quercus montana, Quercus velutina, Pinus pungens, Pinus rigida, Pinus virginiana*, and by the absence or unimportance of *Quercus bicolor, Quercus ellipsoidalis, Quercus macrocarpa, Quercus stellata, Pinus echinata*, or *Pinus taeda*.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M882 | Central Midwest Mesic Forest |  |
| M883 | Appalachian-Interior-Northeastern Mesic Forest |  |
| M012 | Central Midwest Oak Forest, Woodland & Savanna | occurs to the west and is differentiated by *Quercus macrocarpa* and *Quercus ellipsoidalis*, and the absence or unimportance of *Quercus coccinea, Quercus velutina*, and *Quercus montana*. |
| M016 | Southern & South-Central Oak - Pine Forest & Woodland | occurs farther south and, although it overlaps in species composition, generally lacks *Pinus strobus* and includes *Pinus echinata, Pinus taeda*, and *Quercus stellata* as characteristic species. |
| M505 | Laurentian-Acadian Acidic Rocky Scrub & Grassland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Physiognomy of this vegetation ranges from closed forest to open woodland, with deciduous trees, needle-leaved trees, or a mixture of both. The shrub layer is often well-developed and characterized by heath shrubs in more infertile settings. Where this macrogroup occurs on the coast and on other highly exposed sites such as bedrock outcrops, steep slopes, and shale barrens, canopy trees may be stunted, gnarled, or wind-sheared. Tree canopies in coastal settings may also share dominance with tall shrubs and heavy vine cover.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Acidic parent materials of low fertility support forests dominated by *Quercus coccinea, Quercus falcata, Quercus montana (= Quercus prinus), Quercus velutina*, as well as other hardwoods such as *Liriodendron tulipifera, Nyssa sylvatica, Sassafras albidum*, and pines, including *Pinus pungens, Pinus rigida, Pinus strobus*, and *Pinus virginiana*, often overtopping a well-developed heath shrub layer comprising species of *Gaylussacia, Rhododendron, Vaccinium*, and others. *Castanea dentata* is an important understory component. The herbaceous layer may be poorly developed where tree or shrub canopies are dense; typical species include *Carex pensylvanica, Danthonia spicata, Deschampsia flexuosa, Gaultheria procumbens*, and others.

Less acidic or neutral parent materials support many of the same oak species as on acidic parent materials, in combination with *Carya* spp., *Betula alleghaniensis, Betula lenta, Fraxinus americana*, and *Fagus grandifolia*. Shrubs and understory tree species can include *Carpinus caroliniana, Cornus florida, Euonymus americanus, Hamamelis virginiana, Lindera benzoin, Oxydendrum arboreum, Viburnum acerifolium*; typical species of the herb layer include *Amphicarpaea bracteata, Arisaema triphyllum, Botrychium virginianum, Galium circaezans, Hexastylis arifolia, Hexastylis minor, Medeola virginiana, Mitchella repens, Parthenocissus quinquefolia, Polygonatum pubescens, Polystichum acrostichoides*, and *Thelypteris noveboracensis*.

*Quercus muehlenbergii* and *Acer saccharum* are particularly characteristic of parent materials of higher base status. Typical shrub species in this setting may include *Cercis canadensis, Viburnum prunifolium*, and *Viburnum rafinesqueanum*. The herbaceous layer is more species-rich than in infertile sites, and include mesophytic species such as *Actaea pachypoda, Adiantum pedatum, Aquilegia canadensis, Asclepias quadrifolia, Carex eburnea, Carex platyphylla, Dichanthelium boscii, Elymus hystrix, Hepatica nobilis*, and *Packera obovata*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: At moderate to low elevations, stands are naturally stable, uneven-aged forests, with canopy dynamics generally dominated by gap-phase regeneration. Wind or ice storms may create larger canopy openings. Fire occurred fairly frequently in pre-European-settlement times but much less so now. Higher-elevation examples may occur on exposed ridges where they are subject to frequent ice storms in the winter, windstorms in the summer, and high winds throughout the year. In pine barrens, fire is particularly important in arresting succession to hardwood dominance. Vegetation on highly exposed bedrock or very steep slopes may be edaphically controlled. In maritime situations, frequent storms, high winds, and salt spray impact physiognomy. Treefalls are common, causing canopy gaps and highly variable structure. Many of these forests were logged in early settlement, and when oaks were removed, their re-establishment was hampered by their slow growth in these exposed settings. They were replaced by fast-growing early-successional species with fruits and/or seeds that are either bird- or wind-dispersed. Heavy browsing by deer impact both the structure and composition of herbaceous and shrub layers, and can hamper tree regeneration. Outbreaks of southern pine beetle (*Dendroctonus frontalis*) can shift pine-dominated forests and woodlands to deciduous forest.

ENVIRONMENT

Environmental Description: A range of environmental settings support this vegetation. Soils may be deep to shallow to essentially lacking. Substrates may be well-drained bedrock, sand, loam, or shale talus; base status ranges from low to high. Topography ranges from steep slopes to well-drained sandplains, from low elevations (sea level) to high elevations (over 1220 m [4000 feet] in the Southern Blue Ridge). Base status of parent materials is an important gradient that separates the component groups of this macrogroup.

DISTRIBUTION

\*Geographic Range: This macrogroup ranges across temperate eastern North America, from Wisconsin and southern and south-central Canada east to the Atlantic Coast, and south to Alabama and Georgia. The western extent is defined more or less by the Appalachians but does not range into the Interior Low Plateau or Ozarks, ranging east to the Atlantic Coast north to southern Maine.

Nations: CA, US

States/Provinces: AL, CT, DC, DE, GA, IL?, IN, KY, MA, MD, ME, MI?, NC, NH, NJ, NS, NY, OH, ON, PA, QC, RI, SC, TN, VA, VT, WI, WV

USFS Ecoregions (2007) [optional]: 211E:CC, 211Fd:CCC, 221Ab:CCC, 221Ac:CCP, 221Af:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, 221Bc:CCC, 221Dc:CCC, 232A:CC, 232Hc:CCC, M221Ac:CCC, M221Be:CCC, M221Db:CCC, M221Dd:CCC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G015 | Appalachian Oak / Chestnut Forest |
| G016 | Northeastern Chinquapin Oak - Red-cedar Alkaline Forest & Woodland |
| G650 | Northeastern Oak - Hickory Forest & Woodland |
| G495 | North Atlantic Maritime & Coastal Plain Forest |
| G161 | Pitch Pine Barrens |
| G162 | Virginia Pine - Table Mountain Pine Woodland & Barrens |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Appalachian Oak Forest | Küchler 1964 |  |
| = | Appalachian Oak section | Dyer 2006 |  |
| < | Black Oak: 110 | Eyre 1980 |  |
| = | Chestnut Oak - American Chestnut Forest Group | Faber-Langendoen and Menard 2006 |  |
| > | Chinquapin Oak - Ash - Red-cedar Forest Group | Faber-Langendoen and Menard 2006 | This group includes forests further west in which *Juniperus ashei* is characteristic. |
| = | Maritime pitch pine dune woodland | Edinger et al. 2002 |  |
| < | Northeastern Oak - Pine Forest | Küchler 1964 |  |
| < | Northern Red Oak: 55 | Eyre 1980 |  |
| < | Oak - Chestnut Forest Region | Braun 1950 | While a forest region is not equivalent to a forest group, the characterization of the major forest cover in this region fits the macrogroup concept in part |
| < | Oak - Hickory Forest | Küchler 1964 |  |
| > | Pitch Pine - Virginia Pine Forest Group | Faber-Langendoen and Menard 2006 |  |
| < | White Oak - Black Oak - Northern Red Oak: 52 | Eyre 1980 |  |
| > | White Oak: 53 | Eyre 1980 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: E.L. Braun (1950)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: L. Sneddon

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by S.C. Gawler, M. Pyne, and D. Faber-Langendoen.

Version Date: 15 Oct 2014

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1. Forest & Woodland

1.B.2.Na. Eastern North American Forest & Woodland

M883. Appalachian-Interior-Northeastern Mesic Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Na. Eastern North American Forest & Woodland (D008)

Elcode: M883

\*Scientific Name: Appalachian-Interior-Northeastern Mesic Forest Macrogroup

\*Common (Translated Scientific) Name: Appalachian-Interior-Northeastern Mesic Forest Macrogroup

\*Colloquial Name: Appalachian-Interior-Northeastern Mesic Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M008 | Southern Mesic Mixed Broadleaf Forest |  |
| M882 | Central Midwest Mesic Forest |  |
| M016 | Southern & South-Central Oak - Pine Forest & Woodland |  |
| M502 | Appalachian-Northeastern Oak - Hardwood - Pine Forest & Woodland |  |
| M012 | Central Midwest Oak Forest, Woodland & Savanna |  |
| M014 | Laurentian-Acadian Mesic Hardwood - Conifer Forest |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CA, US

States/Provinces: AL, CT, GA, IL, IN, KY, MA, MD, ME?, NC, NH, NJ, NY, OH, ON, PA, QC?, SC, TN, VA, VT, WV

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G020 | Appalachian-Central Interior Mesic Forest |
| G742 | Appalachian-Allegheny Northern Hardwood - Conifer Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-12-05 | M153 Acer saccharum - Tilia americana - Fagus grandifolia Forest Macrogroup | M153 split into M882 & M883 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.2.Na. Eastern North American Forest & Woodland

M882. Central Midwest Mesic Forest

Type Concept Sentence: These hardwood forests are dominated by a mixture of *Acer saccharum, Fagus grandifolia, Quercus rubra*, and *Tilia americana* found on rich, mesic sites in the central hardwood region of the Midwest from Ohio to the Ozark/Ouachita regions and west into the eastern Great Plains.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Na. Eastern North American Forest & Woodland (D008)

Elcode: M882

\*Scientific Name: Central Midwest Mesic Forest Macrogroup

\*Common (Translated Scientific) Name: Central Midwest Mesic Forest Macrogroup

\*Colloquial Name: Central Midwest Mesic Forest

\*Type Concept: This macrogroup comprises forests characterized by a mostly closed canopy dominated a mixture of *Acer saccharum, Fagus grandifolia, Quercus rubra*, and *Tilia americana* (or in some cases *Acer floridanum* or *Acer nigrum*). Other common species include *Aesculus glabra, Carya cordiformis, Carya ovata, Celtis* spp., *Fraxinus americana, Juglans nigra, Quercus alba, Quercus muehlenbergii*, and *Ulmus rubra*. It occurs in the central hardwood region of the Midwest from western Ohio to the eastern Great Plains, and south into the Ozarks and Ouachitas on mesic, rich soils formed from glacial till or loess parent material. Examples in the Ozark region are often from base-rich substrates such as limestones and dolomites. Small-gap development and replacement due to wind or tree death are the most common natural dynamics. However, conversion to agriculture, logging, browsing, and grazing have greatly impacted this macrogroup. Once common in many areas, very few large stands remain intact across its range.

\*Diagnostic Characteristics: Mostly closed-canopy hardwood forests dominated by *Acer saccharum* and found within the central United States and Canada on mesic, rich soils.

\*Classification Comments: This macrogroup was originally part of Central Mesophytic Hardwood Forest Macrogroup (M153) which was split into this macrogroup (M882) and ~Appalachian-Interior-Northeastern Mesic Forest Macrogroup (M883)$$.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M008 | Southern Mesic Mixed Broadleaf Forest |  |
| M883 | Appalachian-Interior-Northeastern Mesic Forest |  |
| M016 | Southern & South-Central Oak - Pine Forest & Woodland |  |
| M502 | Appalachian-Northeastern Oak - Hardwood - Pine Forest & Woodland |  |
| M012 | Central Midwest Oak Forest, Woodland & Savanna |  |
| M014 | Laurentian-Acadian Mesic Hardwood - Conifer Forest |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is composed of broad-leaved deciduous trees forming a closed canopy. Stands are diverse and productive. Understory trees are common with a variable shrub layer and a rich, diverse herbaceous layer.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Canopies are characterized by any mixture of *Acer saccharum, Fagus grandifolia, Quercus rubra*, and *Tilia americana* (or in some cases *Acer floridanum (= Acer barbatum)* or *Acer nigrum*). Associates include *Aesculus glabra, Carpinus caroliniana, Carya cordiformis, Carya ovata, Celtis* spp., *Fraxinus americana, Ostrya virginiana, Prunus serotina, Quercus alba, Quercus muehlenbergii*, and *Ulmus rubra*. *Acer saccharum* tends to be a dominant canopy species, although the dominance of *Acer saccharum* compared to other species can vary across the range of this macrogroup based on regional climate and microclimate. Shrubs and woody vines vary greatly with location but may include *Asimina triloba, Frangula caroliniana, Hamamelis virginiana, Hydrangea arborescens, Lindera benzoin, Symphoricarpos orbiculatus, Viburnum rufidulum*, and *Vitis aestivalis*. Understory herbaceous species are diverse and rich. Some typical species include *Actaea* spp., *Adiantum pedatum, Allium* spp., *Amphicarpaea bracteata, Anemone quinquefolia, Aplectrum hyemale, Aralia racemosa, Arisaema triphyllum, Asimina triloba, Aristolochia serpentaria, Asarum canadense, Brachyelytrum erectum, Cardamine concatenata, Caulophyllum* spp., *Chasmanthium latifolium, Circaea lutetiana ssp. canadensis, Collinsonia canadensis, Hepatica nobilis var. acuta, Iris cristata, Osmorhiza claytonii, Panax quinquefolius, Phryma leptostachya, Podophyllum peltatum, Polygonum virginianum, Polygonatum* spp., *Sanguinaria canadensis, Sanicula* spp., *Tiarella cordifolia, Trillium grandiflorum, Uvularia grandiflora*, and *Viola* spp.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: This macrogroup primarily naturally contains stable, uneven-aged forests, with canopy dynamics dominated by small-gap development and replacement due to tree death. Wind, ice events, and fire can impact this macrogroup over long return intervals and may disturb larger patches. The greatest impacts on this macrogroup are due to conversion to agriculture, logging, browsing, and grazing.

ENVIRONMENT

Environmental Description: This macrogroup occurs in various landscape settings, often on rolling uplands and valley slopes, typically with a northern or eastern aspect. It also can occur within bottoms, ravines and sinkhole basins. Soils are high-nutrient, rich loams, ranging from shallow to deep. In examples in the Ozark/Ouachita region, substrate is typically limestone or dolomite. Thick layers of humus and leaf litter can occur.

DISTRIBUTION

\*Geographic Range: This macrogroup ranges across the north temperate region of eastern North America from western Ohio to Minnesota and the Great Lakes south through the Ozarks and Ouachitas of Missouri, Arkansas and Oklahoma, and eastern Kansas and Nebraska.

Nations: CA, US

States/Provinces: AR, IA, IL, IN, KS, MI, MN, MO, NE, OH, OK, ON, QC, WI

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G791 | Ozark-Ouachita Mesic Forest |
| G021 | North-Central Beech - Maple - Basswood Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-12-05 | M153 Acer saccharum - Tilia americana - Fagus grandifolia Forest Macrogroup | M153 split into M882 & M883 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S.E. Menard

Acknowledgments [optional]:

Version Date: 04 May 2015

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\*References [Required if used in text]:

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1. Forest & Woodland

1.B.2.Na. Eastern North American Forest & Woodland

M159. Laurentian-Acadian Pine - Hardwood Forest & Woodland

Type Concept Sentence: These Laurentian-Acadian pine-oak forests have closed to open canopies dominated by pines (*Pinus banksiana, Pinus resinosa, Pinus strobus*) with a mix of oak species (*Quercus ellipsoidalis, Quercus rubra*) and other hardwoods, over an often heathy shrub layer. Sites typically occur on sandplains, outwash habitats, and coarse glacial deposits of sandy or loamy soils with dry to dry-mesic moisture conditions and occasional to frequent fires.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Na. Eastern North American Forest & Woodland (D008)

Elcode: M159

\*Scientific Name: *Pinus strobus - Pinus banksiana - Quercus ellipsoidalis* Forest & Woodland Macrogroup

\*Common (Translated Scientific) Name: Eastern White Pine - Jack Pine - Northern Pin Oak Forest & Woodland Macrogroup

\*Colloquial Name: Laurentian-Acadian Pine - Hardwood Forest & Woodland

\*Type Concept: Stands of this Laurentian-Acadian macrogroup consist of a pine or oak overstory forming an open, patchy or continuous canopy with a variable understory. A combination of *Pinus strobus, Pinus banksiana, Pinus resinosa*, and (less commonly) *Picea mariana* are typical diagnostic overstory species. Common associates include the oaks *Quercus ellipsoidalis* and *Quercus rubra* along with a mix of other hardwoods, such as *Acer rubrum, Betula papyrifera, Populus grandidentata, Populus tremuloides, Thuja occidentalis*, and, less commonly, *Juniperus virginiana* which may dominate some examples on limestone habitats. The richness of the herbaceous layer is variable, but is typically moderately poor in closed-canopy stands and poor to rich in open stands. Stands may have a dominant cover of feathermosses and lichens. *Corylus cornuta* and *Corylus americana* are common tall shrubs; common low shrubs include *Vaccinium angustifolium* and *Vaccinium myrtilloides*. This macrogroup occurs from western Minnesota to the northern and western Great Lakes region, and into the northeastern United States, and possibly southeastern Canada. It occurs primarily on sandplains, outwash habitats, and coarse glacial deposits of sandy or loamy soils. Some examples occur on thin-soil limestone habitats such as bluffs adjacent to lakes, cliffs or talus and colluvial slopes. Fire is an important disturbance. Logging and forest management impact this macrogroup across its range.

\*Diagnostic Characteristics: Open to closed (10 to >80%) canopy cover typical of forests and pine barrens in the northern Midwest and Northeast U.S. (and possibly southeastern Canada), and dominated by pine species, in particular *Pinus strobus, Pinus banksiana* (mostly in the Great Lakes), *Pinus resinosa*, and (less commonly) *Picea mariana*. Hardwoods such as *Populus tremuloides, Quercus ellipsoidalis*, and *Quercus rubra* are common associates. Shrub layer often contains a heath component. *Thuja occidentalis, Pinus banksiana*, and *Larix laricina* are diagnostic in limestone woodlands.

\*Classification Comments: Overall composition of the macrogroup now includes all dry and dry-mesic pine-oak forests to open woodlands throughout the Laurentian-Acadian region, but it is unclear whether this macrogroup occurs in Canada; or, if so, whether it will be recognized as a distinct macrogroup, as the CNVC could treat these as edaphic expressions within ~Laurentian-Acadian Mesic Hardwood - Conifer Forest Macrogroup (M014)$$. Two "subboreal" groups (G347 and G047, respectively) occur in this macrogroup; they have sufficient temperate influence to separate them from the core boreal forest types.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M014 | Laurentian-Acadian Mesic Hardwood - Conifer Forest | occurs on more mesic soils and is dominated by conifers such as *Abies balsamea, Picea* spp., and *Tsuga canadensis* and mesic hardwood species such as *Acer saccharum* and *Betula alleghaniensis*. |
| M012 | Central Midwest Oak Forest, Woodland & Savanna |  |
| M495 | Eastern North American Boreal Forest | represents the main boreal forest that occurs to the north of this macrogroup in Canada. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: These sites range from closed-canopy conifer or conifer-hardwood forests to open woodlands and barrens ranging from >80% cover to as little as 10% cover. Shrub, herb, and nonvascular plants vary in cover but are limited by needle condition, dry conditions, and exposed bedrock. Fire suppression can lead to increased cover in barrens and woodland sites.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Pinus strobus* and *Pinus resinosa* are diagnostic overstory species. In the northwestern Great Lakes portion of the range, *Pinus banksiana* and *Picea mariana* can be dominant in dry forest and woodland sites. In dry-mesic northern forests, *Picea mariana, Picea glauca, Picea rubens*, and/or *Abies balsamea* can occur in the canopy. *Quercus rubra* or *Quercus ellipsoidalis* are common oak hardwood associates. Early-successional hardwoods such as *Acer rubrum, Betula papyrifera, Populus grandidentata*, and *Populus tremuloides* are often present and may codominate with the conifers and oaks in some stands. In limestone woodlands, the most abundant trees are *Thuja occidentalis* and *Pinus banksiana* with *Larix laricina* as a common associate. The understory ranges from moderate cover to extremely poor. Common tall shrubs include *Amelanchier* spp. and *Corylus cornuta*. Dwarf-shrubs can be very common, especially where gaps in the canopy occur in more closed-canopy examples and within barrens and woodland sites. Common species include ericaceous species such as *Gaultheria procumbens, Vaccinium angustifolium*, and *Vaccinium myrtilloides*. Less commonly *Dasiphora fruticosa ssp. floribunda* and *Juniperus horizontalis* occur on enriched sites. In closed-canopy sites with a moderate herb layer, common species include *Aralia nudicaulis, Chimaphila umbellata, Cornus canadensis, Epigaea repens, Eurybia macrophylla, Maianthemum canadense, Oryzopsis asperifolia, Pteridium aquilinum*, and *Trientalis borealis*. The predominant moss species are *Dicranum* spp. and *Pleurozium schreberi*. Characteristic herbs in Great Lakes barrens are dominated by grasses and sedges, including *Andropogon gerardii, Apocynum androsaemifolium, Carex pensylvanica*, and *Schizachyrium scoparium*. Grasses and sedges such as *Carex eburnea, Carex richardsonii, Carex scirpoidea, Clinopodium arkansanum, Schizachyrium scoparium*, and *Sporobolus heterolepis* also dominate the herbaceous layer in limestone woodlands.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Fire is an important natural disturbance, including occasional catastrophic and crown fires, which allow the regeneration of pines on these sites. A combination of surface fires every 20-30 years and severe crown fires every 100-150 years maintained presettlement *Pinus* spp. communities (Heinselman 1973, Whitney 1986, Frelich 1992). Logging and subsequent fires are also predominant in some examples of this type and may result in open bracken grasslands (Curtis 1959).

ENVIRONMENT

Environmental Description: This macrogroup occurs in a cool north temperate to sub-boreal climate on glaciated landscapes such as outwash plains, glacial lakeplains and river terraces. Substrates include sand and gravel deposits on flats, such as outwash sands, delta sands, eskers, kames, kame terraces, and dry lake sands. Sites occur on dry to dry-mesic thin to deep mineral soils ranging from dry sands to dry-mesic loams. Some sites can occur on rocky or bedrock soils (Curtis 1959).

DISTRIBUTION

\*Geographic Range: This macrogroup is found within the northern temperate (Laurentian-Acadian) areas of the U.S. and Canada. It ranges from western Minnesota into the northeastern United States and south-central and southeastern Canada. The more sub-boreal examples extend into northeastern Minnesota and northern New England, and may occur into southeastern Canada.

Nations: CA, US

States/Provinces: CT, DE, MA, MB?, MD, ME, MI, MN, NH, NJ, NS?, NY, OH, ON?, PA, QC?, RI, VT, WI

USFS Ecoregions (2007) [optional]: 211A:CP, 211B:CC, 211C:CC, 211D:CC, 211E:CC, 211J:CP, 212Ha:CCC, 212Hb:CCC, 212Hc:CCC, 212Hd:CCC, 212He:CCC, 212Hf:CCC, 212Hg:CCC, 212Hh:CCC, 212Hi:CCC, 212Hj:CCC, 212Hk:CCC, 212Hl:CCC, 212Hm:CCC, 212Jb:CCC, 212Jc:CCC, 212Jo:CCC, 212Ka:CCC, 212Kb:CCC, 212La:CCC, 212Lb:CCC, 212Lc:CCC, 212Ld:CCC, 212Le:CCC, 212Ma:CCC, 212Mb:CCC, 212Na:CCC, 212Nb:CCC, 212Nc:CCC, 212Nd:CCC, 212Qa:CCC, 212Qb:CCC, 212Qc:CCC, 212Qd:CCC, 212Ra:CCC, 212Rb:CCC, 212Rc:CCC, 212Rd:CCC, 212Re:CCC, 212Sb:CCC, 212Sc:CCC, 212Sn:CCC, 212Sq:CCC, 212Ta:CCC, 212Tb:CCC, 212Tc:CCC, 212Te:CCC, 212Tf:CCC, 212Xa:CCC, 212Xb:CCC, 212Xc:CCC, 212Xd:CCC, 212Xe:CCC, 212Xf:CCC, 212Ya:CCC, 212Za:CCC, 212Zb:CCC, 212Zc:CCC, 221Ai:CCC, 221Al:CCC, 222I:CP, 222Ja:CCC, 222Jb:CCC, 222R:CC, 222Ud:CCC, 222Ue:CCC, M211A:CC, M211Bd:CCC, M211C:CP, M211D:CP

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G025 | Laurentian-Acadian Pine - Oak Forest & Woodland |
| G347 | Laurentian Subboreal Dry Jack Pine - Red Pine - Oak Woodland |
| G047 | Laurentian Subboreal Dry-Mesic Pine - Black Spruce - Hardwood Forest |
| G160 | Great Lakes Pine Barrens |
| G655 | Laurentian-Acadian Limestone Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Northern dry forest | Curtis 1959 |  |
| < | Northern dry-mesic forest | Curtis 1959 |  |
| = | Northern forest - xeric | Curtis 1959 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.T. Curtis (1959)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S. Menard, S. Gawler, and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 21 May 2015

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1. Forest & Woodland

1.B.2.Nb. Rocky Mountain Forest & Woodland

D194. Rocky Mountain Forest & Woodland

Type Concept Sentence: This division is composed of forests, woodlands and savannas of the lower montane to subalpine zones of the continental temperate climates of western North America characterized by the conifers *Abies concolor, Abies grandis, Abies lasiocarpa, Abies religiosa, Juniperus* spp. (*Juniperus osteosperma, Juniperus scopulorum*), *Larix lyallii, Larix occidentalis, Picea engelmannii, Picea x albertiana, Picea pungens, Pinus albicaulis, Pinus aristata, Pinus contorta var. latifolia, Pinus flexilis, Pinus hartwegii, Pinus longaeva, Pinus ponderosa* (*var. brachyptera, var. ponderosa, var. scopulorum*), *Pseudotsuga menziesii var. glauca, Thuja plicata*, and *Tsuga heterophylla*.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.2.Nb. Cool Temperate Forest & Woodland (F008)

Elcode: D194

\*Scientific Name: *Pseudotsuga menziesii - Tsuga heterophylla - Abies lasiocarpa* Forest & Woodland Division

\*Common (Translated Scientific) Name: Douglas-fir - Western Hemlock - Subalpine Fir Forest & Woodland Division

\*Colloquial Name: Rocky Mountain Forest & Woodland

\*Type Concept: This division is composed of conifer forests, woodlands and savannas of the lower montane to subalpine zones of the continental temperate climates of western North America. These communities occur in the interior Pacific Northwest, the southern Rocky Mountains, and extend east of the Continental Divide into the northwestern Great Plains region, and south at high elevations of the Sierra Madre Mountains. Strong diagnostic conifers (needle-leaved trees) are *Abies concolor, Abies lasiocarpa, Abies religiosa, Juniperus* spp. (*Juniperus osteosperma, Juniperus scopulorum*), *Larix lyallii, Larix occidentalis, Picea engelmannii, Picea x albertiana, Picea pungens, Pinus albicaulis, Pinus aristata, Pinus contorta var. latifolia, Pinus flexilis, Pinus hartwegii, Pinus longaeva, Pinus ponderosa* (*var. brachyptera, var. ponderosa, var. scopulorum*), and *Pseudotsuga menziesii var. glauca*. Other conifers that are common in these forests and woodlands are *Abies grandis, Thuja plicata, Tsuga heterophylla*, and *Tsuga mertensiana*. Deciduous hardwoods (broad-leaved deciduous trees) are infrequent and include *Acer grandidentatum, Betula papyrifera*, and *Populus tremuloides*. Savannas and woodlands occur commonly in dry climates and on dry sites, and in some cases may be dominated by short trees in a "scrub woodland" form. Woodlands also predominate at high elevations, and at the highest elevations stands are composed of tree clumps or ribbons, with intervening grasslands or shrublands. Evergreen conifers dominate stands overall. Deciduous hardwoods can occur, intermingling with conifers, and deciduous conifers can dominate some areas. Stands can be composed of just one tree species, but more often are of mixed composition, sometimes of a diverse mix. Shrub and herb layers vary widely. Sometimes the shrub layer is dominant, with tall or short broad-leaved deciduous or needle-leaved evergreen shrubs; in other cases, perennial forbs and graminoids (grasses or sedges) are the predominant growth forms. Nonvascular species (mosses, liverworts, lichens, fungi, or soil cryptogams) also vary considerably in abundance, but many forests have a high cover of mosses.

The climate is cool temperate and continental, although many areas are influenced somewhat by Pacific maritime air masses. Temperature regimes vary considerably across the range, and between seasons. Precipitation ranges from 25-240 cm annually. All areas receive winter snow, but winter rain is also possible in most areas. In many areas, a seasonal drought period occurs. In most of the range, more arid grassland climates occur at elevations below this type and alpine tundra occurs at elevations above. Elevations range considerably. Landforms are variable and can include canyons, plateaus, draws, benches, hills, mesas, rolling plains, cinder cones, ravines, ridgetops, shoulders, sideslopes and toeslopes. Slopes can be gentle to extremely steep. Bedrock geology includes volcanic, intrusive, metamorphic, sedimentary and ultramafic rocks. Fractured rock, colluvium, and eolian materials are common substrates. Glacially-derived substrates are typical in mountainous and northern areas, and volcanically-derived substrates are common in central and southern areas. Fire is the predominant natural disturbance factor of this type. There is a strong correlation between climate and the fire regime: drier climates are dominated by fire-dependent vegetation with stand-maintaining fires common and/or short interval stand-replacing fires (as short as 30-50 years), whereas wetter climates are characterized by long fire-return intervals for stand-replacing fire events (up to 500 years or more). In recent times, fire suppression has changed the fire dynamics of natural forests. Other natural disturbance agents are insect outbreaks, disease, occasional windthrow, and avalanches. Forest harvesting is also a major factor over most of the type.

\*Diagnostic Characteristics: Forests, woodlands and savannas found in the lower montane to subalpine zones of the interior Pacific Northwest, southern Rocky Mountains, and extending east into the northwestern Great Plains regions. Strong diagnostic conifers are *Abies concolor, Abies lasiocarpa, Juniperus* spp. (*Juniperus osteosperma, Juniperus scopulorum*), *Larix lyallii, Larix occidentalis, Picea engelmannii, Picea x albertiana* hybrids, *Picea pungens, Pinus albicaulis, Pinus aristata, Pinus contorta var. latifolia, Pinus flexilis, Pinus longaeva, Pinus ponderosa* (*var. brachyptera, var. ponderosa, var. scopulorum*), and *Pseudotsuga menziesii var. glauca*. Associated conifers common in this division are *Abies grandis, Thuja plicata, Tsuga heterophylla*, and *Tsuga mertensiana*. Deciduous hardwoods include *Acer grandidentatum, Betula papyrifera*, and *Populus tremuloides*. Some strong diagnostic understory species are *Calamagrostis rubescens, Vaccinium myrtillus, Vaccinium membranaceum, Vaccinium scoparium*, and *Xerophyllum tenax*.

\*Classification Comments: In the western range of this division, where it abuts 1.B.2.Nd ~Vancouverian Forest & Woodland Division (D192)$$, forests and woodlands are divided between the two divisions based on the predominance of species characteristic of each division. As there is overlap between the two in some tree species such as *Abies grandis, Pinus contorta, Pinus ponderosa, Pseudotsuga menziesii, Thuja plicata*, and *Tsuga heterophylla*, understory species are helpful in distinguishing them. Understory species such as *Gaultheria shallon, Rubus spectabilis, Mahonia nervosa, Polystichum munitum*, and *Rhytidiadelphus loreus* are found in D192, whereas *Vaccinium membranaceum, Vaccinium scoparium, Calamagrostis rubescens, Xerophyllum tenax*, and *Pleurozium schreberi* predominate in D194. In addition, there are variety differences in several of the tree species: for *Pinus contorta*, *var. latifolia* is this found in this division (D194), whereas *var. contorta* occurs in D192. For *Pseudotsuga menziesii*, *var. glauca* occurs in D194, and *var. menziesii* in D192, although some *var. menziesii* occurs in the western edge of this division. *Pinus ponderosa* has several varieties in this division, *var. brachyptera, var. ponderosa*, and *var. scopulorum*, whereas *var. benthamiana* occurs in D192. Note that a recent paper describes five subspecies for *Pinus ponderosa*; in that treatment (Callaham 2013), *ssp. critchfieldiana* is the Pacific subspecies.

In the north, this division abuts forests and woodlands of 1.B.4.Na ~North American Boreal Forest & Woodland Division (D014)$$. Again, forests and woodlands are divided between the two divisions based on the predominance of species characteristic of each division. D014 is characterized by *Picea glauca*, instead of *Picea glauca x engelmannii* or *Picea engelmannii* of this division. *Pseudotsuga menziesii* extends into northern forests of this division, on warm-aspect sites but is absent from D014. *Larix laricina* is of increasing importance in D014. In addition, many of the understory species that are common in the northern forests of D194, e.g., *Vaccinium membranaceum, Oplopanax horridus*, and *Gymnocarpium dryopteris*, are mostly absent from the D014. *Ledum groenlandicum, Vaccinium vitis-idaea, Arctostaphylos rubra*, and *Dasiphora fruticosa ssp. floribunda* are more prevalent in upland forests in D014.

The southernmost forests of this division occur at upper elevations of the Sierra Madre Mountains. These conifer-dominated subalpine forests occur at elevations above 1.B.1.Nd ~Madrean-Balconian Woodland & Scrub Division (D060)$$, which includes Madrean species of pinyon, juniper and oak, or conifer-oak mixed forests. The characteristic conifer species of this division are *Abies concolor, Abies guatemalensis, Abies religiosa, Pinus hartwegii*, and/or *Pinus montezumae*.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D007 | Californian Forest & Woodland | includes warmer climate forests, woodlands and savannas dominated by oak and conifer species that occur south and west of D194. |
| D060 | Madrean-Balconian Forest & Woodland | includes warmer climate evergreen, conifer or broad-leaved forests, woodlands or savannas of Madrean species of pinyon, juniper and oak, or conifer-oak mixed forests that occur to the south of D194. |
| D010 | Western North American Pinyon - Juniper Woodland & Scrub |  |
| D192 | Vancouverian Forest & Woodland | includes predominately conifer forests and woodlands of temperate maritime (coastal) areas that occur to the west of D194. |
| D195 | Rocky Mountain-Great Basin Montane Flooded & Swamp Forest | includes floodplain and swamp forests over the range of D194. |
| D014 | North American Boreal Forest & Woodland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The communities of this type are mostly forests and woodlands but include savannas and tree islands. Savannas and woodlands occur commonly in dry climates and on dry sites, and in some cases may be dominated by short trees in a "scrub woodland" form. Woodlands also predominate at high elevations, and at the highest elevations stands are comprised of tree clumps or ribbons, with intervening grasslands or shrublands. Evergreen conifers dominate stands overall. Deciduous hardwoods can occur, intermingling with conifers stands, and deciduous conifers can dominate some areas. Stands can be composed of just one tree species, but more often are of mixed composition, sometimes of a diverse mix. Shrub and herb layers vary widely, with tall or short deciduous or evergreen shrubs dominating the undergrowth, or in some cases with few or no shrubs, and perennial forbs, grasses or sedges are the predominant growth forms. Nonvascular species (mosses, liverworts, lichens, fungi, or soil cryptogams) also vary considerably in abundance, but many forests have a high cover of mosses.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The forests and woodlands of this type include characteristic western North American conifers (needle-leaved trees) such as *Abies grandis, Abies lasiocarpa, Larix occidentalis, Picea engelmannii, Pinus contorta var. latifolia, Pinus flexilis, Pinus ponderosa, Pseudotsuga menziesii, Thuja plicata*, and *Tsuga heterophylla*. Many of these species are wide-ranging but occur in specific environments influenced by climate, site, and historical conditions.

*Pinus ponderosa* forests and woodlands occur in dry climatic areas and on dry rocky sites or warm aspects over much of the central and southern range. *Pinus ponderosa* often occurs in pure stands, but can also occur as mixed stands with other conifer or hardwood species, e.g., *Pseudotsuga menziesii* in slightly moister climates, or *Quercus macrocarpa* in the northwestern Great Plains. The understory of *Pinus ponderosa* woodlands is varied and can be dominated by broad-leaved shrubs, e.g., *Amelanchier alnifolia, Physocarpus malvaceus, Purshia tridentata, Symphoricarpos albus*, or grasses, e.g., *Festuca idahoensis* and *Pseudoroegneria spicata*. *Pinus ponderosa* can also occur in savannas mixed with grasslands or big sagebrush steppe.

The limber pine - juniper woodlands dominated by *Pinus flexilis, Juniperus osteosperma*, or *Juniperus scopulorum* are included in this type, as are woodlands or "savannas" of the deciduous conifer *Larix occidentalis*.

*Pseudotsuga menziesii* is common in forests of this division. It can dominate many dry climate areas and sites, either in pure stands or mixed with *Pinus ponderosa, Pinus contorta*, or *Larix occidentalis*. The understory can be shrubby or grassy, and sometimes dominated by mosses or lichens. A variety of shrubs occur in these stands, such as *Acer glabrum, Juniperus communis, Physocarpus malvaceus, Symphoricarpos albus*, and *Spiraea betulifolia*. Graminoids are common, e.g., *Calamagrostis rubescens, Carex geyeri*, and forbs are variable, but typical taxa include *Arnica cordifolia, Osmorhiza berteroi, Thalictrum occidentale*, and species of many other genera, including *Erigeron, Fragaria, Lathyrus, Lupinus, Penstemon*, and *Vicia*. *Pseudotsuga menziesii* can persist in more mesic stands as a long-lived seral species.

Mesic conifer forests of the lower montane regions are characteristically mixed stands dominated by two or more of *Abies grandis, Pseudotsuga menziesii, Thuja plicata, Tsuga heterophylla, Larix occidentalis*, and *Pinus contorta*. Other conifers that often comprise part of the stand are *Abies lasiocarpa, Picea engelmannii, Picea glauca x engelmannii*, and *Pinus monticola*. Deciduous hardwood species such as *Populus tremuloides* or *Betula papyrifera* also occur, but typically are not dominant. These stands typically have a well-developed shrub and/or forb understory, as a result of the more mesic conditions, but can be sparse due to a dense canopy. Common shrubs are *Acer glabrum, Amelanchier alnifolia, Paxistima myrsinites, Rubus parviflorus, Spiraea betulifolia, Symphoricarpos albus, Taxus brevifolia*, and *Vaccinium membranaceum*. *Oplopanax horridus* occurs in depressional areas with high water tables. Composition of the herbaceous layer reflects local climate, site, and degree of canopy closure and can include *Adenocaulon bicolor, Aralia nudicaulis, Clintonia uniflora, Cornus canadensis, Goodyera oblongifolia, Linnaea borealis, Tiarella trifoliata, Viola orbiculata*, and *Xerophyllum tenax*. Graminoids are generally only a very minor component. Ferns and fern allies form an important component of the understory on moist sites and commonly include *Athyrium filix-femina, Dryopteris filix-mas, Equisetum* spp., and *Gymnocarpium dryopteris*. A dense moss layer often forms on the forest floor, particularly in northern forests.

Northern forests of this macrogroup are dominated by *Picea x albertiana (= Picea engelmannii x glauca), Abies lasiocarpa*, and/or *Pinus contorta*, with *Pseudotsuga menziesii* occurring in warmer areas and on warm sites. The deciduous hardwood species *Populus tremuloides* and *Betula papyrifera* commonly occur, dominating forests near settlements and around agriculture areas. *Picea mariana* sometimes occurs in these forests. These forests are transitional between temperate and boreal forests. The understory is similar to that of other mesic conifer forests of this division but includes some northern species such as *Rosa acicularis, Lonicera involucrata, Viburnum edule, Rubus pubescens*, and *Galium boreale*.

*Abies lasiocarpa - Picea engelmannii* forests and woodlands characterize upper montane to subalpine zones over much of the range of this division. *Pinus contorta* is often present and can dominate dry climate areas; other associated tree species are *Larix lyallii, Pinus albicaulis, Pinus aristata, Pinus flexilis, Pinus longaeva, Populus tremuloides*, and *Tsuga mertensiana*. Canopies can be mixed or dominated by a single species. Shrub species are highly variable, and typically are cold-deciduous (sometimes evergreen), including *Lonicera utahensis, Ribes inerme*, several *Vaccinium* spp. (*Vaccinium membranaceum (= Vaccinium globulare), Vaccinium myrtillus, Vaccinium scoparium*), *Ledum glandulosum, Menziesia ferruginea, Rhododendron albiflorum*, and *Phyllodoce empetriformis*. Associated herbaceous species are especially diverse given the wide elevational and latitudinal range of these forests, with alpine species occurring near the upper treeline and montane and subalpine species below. Mesic stands include herbaceous species such as *Clintonia uniflora, Eucephalus engelmannii (= Aster engelmannii), Gymnocarpium dryopteris, Heracleum maximum, Luzula glabrata var. hitchcockii, Pedicularis racemosa, Rubus pedatus, Senecio triangularis, Tiarella* spp., *Valeriana occidentalis, Valeriana sitchensis*, and *Xerophyllum tenax*. Drier sites close to the alpine might include xeric graminoids, such as *Calamagrostis purpurascens, Festuca arizonica, Festuca idahoensis*, and *Trisetum spicatum*.

Mid-elevation forests and woodlands of the southern Rocky Mountains are characterized by *Abies concolor, Juniperus scopulorum, Pinus ponderosa, Pseudotsuga menziesii*, and *Picea pungens*. The deciduous *Populus tremuloides* or *Acer grandidentatum* are early-seral species that may be codominant in some stands. Other conifers that may be present include *Abies lasiocarpa, Picea engelmannii, Pinus contorta, Pinus edulis*, and *Pinus flexilis*. In the southernmost range, associated trees may include *Pinus strobiformis* and *Juniperus deppeana*.

High montane (subalpine) forests of the Sierra Madre Mountains, characterized by the conifers *Pinus hartwegii* or *Abies religiosa*, are included in this division. Associated trees include *Abies concolor, Abies guatemalensis, Alnus firmifolia, Cupressus* spp., *Pinus montezumae, Pseudotsuga menziesii*, and *Quercus laurina*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Fire is the predominant natural disturbance factor of forests and woodlands of this division. There is a strong correlation between climate and the fire regime: drier climates are dominated by fire-dependent vegetation with stand-maintaining fires common and/or short interval stand-replacing fires (as short as 30-50 years), whereas wetter climates are characterized by long fire-return intervals for stand-replacing fire events (up to 500 years or more). In recent times, fire suppression has changed the fire dynamics of natural forests. Other natural disturbance agents are insect outbreaks, disease, occasional windthrow, and avalanches. Forest harvesting is also a major factor over most of the type.

Forests and woodlands of very dry climates and sites had historic fire regimes characterized by frequent, low-intensity surface fires that maintained relatively open stands of a mix of fire-resistant species, mostly *Pinus ponderosa* but including *Pseudotsuga menziesii* in some circumstances. Fire maintained the open canopies characteristic of savannas and open woodlands of these species. Mature trees can survive low-intensity surface fires. With human settlement and subsequent fire suppression, stands have become denser. Presently, many occurrences contain understories of more shade-tolerant species, as well as a greater density of younger cohorts. These altered structures have affected fuel loads and altered fire regimes. Presettlement fire regimes were primarily frequent (5- to 15-year return intervals), low-intensity surface fires triggered by lightning strikes or deliberately set by Native Americans. With fire suppression and increased fuel loads, fires are now less frequent and often become intense crown fires, which can kill mature trees. The result is a mixed-severity fire regime for many *Pinus ponderosa* and *Pseudotsuga menziesii* stands as stand-replacing fires are becoming more common.

Forests in dry to moist climates are characterized by stand-replacing fires with a variable return interval, ranging from about 50-150 years. Many of the important tree species in these forests are fire-adapted (e.g., *Populus tremuloides, Pinus ponderosa, Pinus contorta*) or fire-tolerant (e.g., *Pseudotsuga menziesii*) or given the right conditions, regenerate well after fire (e.g., *Picea glauca x engelmannii*). Other species, e.g., *Abies* spp. (*Abies concolor, Abies grandis, Abies lasiocarpa*), *Thuja plicata*, or *Tsuga heterophylla*, are not fire-adapted, but are shade-tolerant and become more prevalent in stands over time, if undisturbed, as the early-seral species die off. Establishment after fire is influenced by availability of seed source or other propagules, e.g., live aspen roots, of the various species in the area. Landscape and site position influence fire behavior as well as regeneration. The pattern of forest types and stand ages on a landscape is the result of the combined influence of seed source, fire behavior, and site conditions.

Forests in wetter climates tend to have long fire-return intervals, ranging from 150 to over 500 years for stand-replacing fires. Gap dynamics are important in older stands and pests and pathogens play a greater role in stand mortality. *Thuja plicata - Tsuga heterophylla* forests are an example of these forests; they can develop into very old forests with large, tall trees. *Picea engelmannii - Abies lasiocarpa* forests can also be very old. Although *Abies lasiocarpa* is not long-lived, it is very shade-tolerant and regenerates well in these upper elevation stands.

Insect pests, such as mountain pine beetle (*Dendroctonus ponderosae*), can cause significant stand and tree mortality and also influence stand development. Expansive stands of *Pinus contorta* that occur in many regions are particularly susceptible. *Pinus albicaulis* is a slow-growing, long-lived conifer that is common at higher elevations in the upper subalpine zone over much of the central and northern range of this division. The exotic pathogen white pine blister rust (*Cronartium ribicola*) is attacking and killing *Pinus albicaulis* trees. It is especially destructive in more mesic habitats that favor infection of its alternate host *Ribes* spp.

Two very slow-growing, long-lived pines in this division are *Pinus longaeva* and *Pinus flexilis*. *Pinus longaeva* may attain nearly 4900 years in age and 12 m in height, whereas *Pinus flexilis* may live 1000 years and attain 18 m in height.

ENVIRONMENT

Environmental Description: These forests and woodlands occur on upland sites of temperate continental regions of western North America. In most of the range, more arid grassland climates occur at elevations below this type and alpine tundra occurs at elevations above. In moist climate areas and in the far northern range, this type occupies all elevations below the alpine. As such, elevations range considerably. Valley forests in northwestern British Columbia as low as 100 m (330 feet) in elevation are included in this type; upper elevation transitions to alpine tundra or dwarf-shrublands occur at 1675 m (5500 feet) in the northern range, and up to 3670 m (12,000 feet) in the south.

*Climate:* The climate of this type is cool temperate and continental, although many areas are influenced somewhat by Pacific maritime air masses. Temperature regimes vary considerably across the range and between seasons. Precipitation ranges from 25-240 cm annually. All areas receive winter snow (50 - 900 cm), but winter rain is also possible in most areas. In many areas, a seasonal drought period occurs. In areas east of the Continental Divide and in the Southwest, summer precipitation predominates, whereas further west and north, winter storms from the west are important sources of precipitation. High snowpack can contribute significantly to early growing season soil moisture in the moister mountains. High winds are a common feature found to the east of the Continental Divide and out in the Great Plains.

*Soils/substrate:* Landforms are variable and can include canyons, plateaus, draws, benches, hills, mesas, rolling plains, cinder cones, ravines, ridgetops, shoulders, sideslopes and toeslopes. Slopes can be gentle to extremely steep. In much of the range of this division, closed to open forests occupy most of the landscape. Some areas and sites are too droughty to support a closed tree canopy, so open woodlands and savannas occur. At the highest elevations, the interaction between snow deposition, desiccating winds, soil and substrate characteristics, and the interacting effects of precipitation, temperature and both latitude and elevation/aspect influence the type of forest, creating krummholz or tree patches in the alpine transition. Occurrences at high elevations are restricted by cold temperatures and are found on warmer aspects, whereas, at lower elevations, occurrences are restricted by lack of moisture and are found on cooler north aspects and mesic microsites.

Bedrock geology includes volcanic, intrusive, metamorphic, sedimentary and ultramafic rocks. Fractured rock, colluvium, and eolian materials are common substrates. Glacial till is typical in mountainous and northern areas, which can also have other glacial parent materials, e.g., glaciolacustrine, glaciofluvial. Volcanic activity is common in central and southern areas with pumice or ash deposits occurring. Many soils have good aeration and drainage, with an abundance of mineral material of medium to coarse textures, and variable rockiness. Soils range from deep and well-developed to shallow and rocky.

*Biogeography:* The expression of the types of forests and woodlands of this division are in response to climatic gradients of temperature and moisture. As most of the mountain ranges are perpendicular to the prevailing winds, moisture gradients are strongly influenced by windward or leeward (rainshadow) positions on the mountain ranges, in conjunction with elevation in the mountains. As such, the forest types occur in elevational bands, e.g., in dry climatic areas of eastern Washington and southern British Columbia, *Pinus ponderosa* forests and woodlands occur at the lowest elevations, with the sequence with increasing elevation (cooler temperatures and more precipitation) from *Pseudotsuga menziesii*, to *Pinus contorta*, to *Abies lasiocarpa - Picea engelmannii* forests. In moister climate regions, e.g., Idaho, the elevation sequence is *Pseudotsuga menziesii* forests, to *Tsuga heterophylla - Thuja plicata* forests, to *Abies lasiocarpa - Picea engelmannii* forests.

The division occurs over a wide latitudinal range so that a particular forest type can occur at very different elevations throughout its range, e.g., *Pinus ponderosa* woodlands occur at 400-800 m in southern British Columbia but at 1800-2700 m in southern Utah. The division is only found at the highest forested elevations in its southern range in Mexico and Guatemala, whereas it occurs from valley bottom to mountaintop (excluding alpine tundra) over most of the southern and central interior of British Columbia.

DISTRIBUTION

\*Geographic Range: This division occurs throughout the southern and central Rocky Mountains, from western Texas and southern New Mexico north into southern Alberta and central British Columbia, west into mountain ranges of central British Columbia, Idaho, and Washington, through the Colorado Plateau, Great Basin and Mojave Desert to the eastern slopes of the Sierra Nevada, Cascades, and Coast Mountains, and then east of the Rocky Mountains to the mountains and highlands of South Dakota, the Greater Yellowstone region, and the Wind River, Gros Ventre and Bighorn ranges of Wyoming. This division also occurs at the high elevations of the Sierra Madre Mountains of Mexico and Guatemala.

Nations: CA, GT, MX, US

States/Provinces: AB, AZ, BC, CA, CO, ID, KS?, MT, MXCP, MXGU, MXJA, MXMI, MXOA, ND, NE, NM, NV, OR, SD, TX, UT, WA, WY

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M022 | Southern Rocky Mountain Lower Montane Forest |
| M501 | Central Rocky Mountain Dry Lower Montane-Foothill Forest |
| M500 | Central Rocky Mountain Mesic Lower Montane Forest |
| M021 | Sierra Madre High Montane Forest |
| M020 | Rocky Mountain Subalpine-High Montane Forest |
| M890 | Rocky Mountain Intermontane Subboreal Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-03-29 | D009 Western North American Cool Temperate Forest Division | D009 split into 2 new divisions (D192 & D194). |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Forests and Meadows of the Rocky Mountains | Peet 2000 | Peet primarily discusses Rocky Mountain forests and woodlands, but does include one section on "Meadows and Parks." We exclude boreal Rocky Mountain forests and low-elevation warm-temperate pine-juniper-evergreen oak woodlands in Arizona, New Mexico and Mexico. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: R.K. Peet (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Meidinger

Acknowledgments [optional]: M.S. Reid

Version Date: 02 Nov 2015

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\*References [Required if used in text]:

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Peet, R. K. 2000. Forests and meadows of the Rocky Mountains. Chapter 3 in: M. G. Barbour and W. D. Billings, editors. North American terrestrial vegetation. Second edition. Cambridge University Press, New York. 434 pp.

1. Forest & Woodland

1.B.2.Nb. Rocky Mountain Forest & Woodland

M501. Central Rocky Mountain Dry Lower Montane-Foothill Forest

Type Concept Sentence: Conifer forests, woodlands and savannas of *Pinus ponderosa* and *Pseudotsuga menziesii*, with *Pinus flexilis* and *Juniperus scopulorum*, found on dry settings of the lower montane to foothill zones of the interior Pacific Northwest, and extending east into the northwestern Great Plains regions.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Nb. Rocky Mountain Forest & Woodland (D194)

Elcode: M501

\*Scientific Name: *Pinus ponderosa var. ponderosa - Pseudotsuga menziesii - Pinus flexilis* Central Rocky Mountain Dry Forest Macrogroup

\*Common (Translated Scientific) Name: Ponderosa Pine - Douglas-fir - Limber Pine Central Rocky Mountain Dry Forest Macrogroup

\*Colloquial Name: Central Rocky Mountain Dry Lower Montane-Foothill Forest

\*Type Concept: This macrogroup comprises conifer forests, woodlands and savannas found on dry settings of the lower montane to foothill zones of the interior Pacific Northwest, and extending east into the northwestern Great Plains regions. It is generally dominated by *Pinus ponderosa var. ponderosa* or *Pinus ponderosa var. scopulorum, Pseudotsuga menziesii, Pinus flexilis*, or *Juniperus osteosperma* or *Juniperus scopulorum*. Other occasional trees may include *Pinus contorta, Picea engelmannii, Picea glauca* (or their hybrid), and in the Great Plains, deciduous trees such as *Acer negundo, Betula papyrifera, Fraxinus pennsylvanica, Populus tremuloides, Quercus macrocarpa*, and *Ulmus americana*. Shrub and herbaceous components are widely variable, ranging from taxa found in the Great Plains mixedgrass region (such as *Andropogon gerardii, Juniperus horizontalis, Prunus* spp., *Schizachyrium scoparium*, or *Yucca glauca*) to those found across the Northern Rockies region into the eastern Cascades (e.g., *Amelanchier alnifolia, Arctostaphylos uva-ursi, Artemisia* spp., *Cercocarpus* spp., *Juniperus communis, Physocarpus malvaceus, Spiraea betulifolia, Symphoricarpos* spp., and graminoids such as *Achnatherum* spp., *Bouteloua gracilis, Calamagrostis rubescens, Carex geyeri, Carex inops, Festuca idahoensis, Hesperostipa comata, Koeleria macrantha, Piptatheropsis micrantha, Poa secunda*, or *Pseudoroegneria spicata*). This is a very wide-ranging macrogroup; it has common substrate and soil characteristics across its range, but from west to east shifts from a climate regime moderately influenced by maritime air masses, to one that is entirely continental. Generally these communities occur in lower montane to foothill settings, or on rock outcrops in the mixedgrass region of the Great Plains. Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops and plateaus are most common. Substrates tend to be composed of limestone, sandstone, dolomite, granite, colluvium, unweathered lava flows, pumice, cinders, or eolian sands. In most cases soil features include good aeration and drainage, coarse textures, circumneutral to slightly acidic pH, an abundance of mineral material, and periods of drought during the growing season.

Most of the communities in this macrogroup are fire-dependent types. Presettlement fire regimes may have been characterized by frequent, low-intensity surface fires that maintained relatively open stands of a mix of fire-resistant species. *Pseudotsuga menziesii* forests were probably subject to a moderate-severity fire regime in presettlement times, with fire-return intervals of 30-100 years. Many of the important tree species in these forests and woodlands are fire-adapted (*Populus tremuloides, Pinus ponderosa, Pinus contorta*), and fire-induced reproduction of *Pinus ponderosa* can result in its continued codominance in *Pseudotsuga menziesii* forests. A subset of the macrogroup includes woodlands and scrub patches that are edaphically controlled rather than fire-dependent. In the limber pine - juniper woodlands, fire is infrequent and spotty because the rocky substrates prevent development of a continuous vegetation canopy needed to spread fire. In other locations, where ponderosa pine is the predominant tree, periodic drought or areas of sand dunes, scablands, and pumice limit tree establishment. This climate-edaphic interaction results in widely scattered trees over "shrub-steppe" of sagebrush, bitterbrush, or sparsely distributed grasses. Tree growth is likely episodic, with regeneration episodes in years with available moisture. The expansion of *Pinus ponderosa* woodlands from the Black Hills montane zone into the central Great Plains may be due to fire suppression.

\*Diagnostic Characteristics: Forests, woodlands and savannas found on dry settings of the lower montane to foothill zones of the interior Pacific Northwest, and extending east into the northwestern Great Plains regions. Generally dominated by *Pinus ponderosa var. ponderosa* or *Pinus ponderosa var. scopulorum, Pseudotsuga menziesii var. glauca, Pinus flexilis*, or *Juniperus osteosperma* or *Juniperus scopulorum*. Other occasional trees may include *Pinus contorta, Picea engelmannii, Picea glauca* (or their hybrid), and in the Great Plains, deciduous trees such as *Acer negundo, Betula papyrifera, Fraxinus pennsylvanica, Populus tremuloides, Quercus macrocarpa*, and *Ulmus americana*.

\*Classification Comments: There are a number of classification issues pertaining to groups within this macrogroup, which may eventually result in conceptual changes to either this macrogroup, or to other related macrogroups. Below are some of the relevant comments. In addition, this description certainly needs review and additions for interior British Columbia or southern Alberta characteristics.

How to treat *Pinus flexilis* in the Rocky Mountains is still somewhat uncertain. For now, there are three groups which have limber pine as a component. The limber pine group included in this macrogroup is composed predominantly of limber pine or juniper that is elevationally below the zone of continuous lower montane forests found in the main Rocky Mountain cordillera. The associations placed in this group are restricted to foothill settings on rock outcrops, or to escarpments in the Great Plains, and in Montana, these are limestone outcrops (L. Vance pers. comm. 2014). Associations extending from the foothill zone into the subalpine, such as ~*Pinus flexilis / Arctostaphylos uva-ursi* Woodland (CEGL000802)$$, are included in ~Rocky Mountain Subalpine-Montane Limber Pine - Bristlecone Pine Woodland Group (G221)$$. Additionally, there are *Juniperus osteosperma*-dominated stands included in this group from the Pryor, Big Horn, and Laramie mountain ranges because these stands are significantly disjunct from the main distribution of *Juniperus osteosperma* in the Colorado Plateau and Great Basin regions and have floristic similarities to the Great Plains.

Forests and woodlands of mixed *Pinus ponderosa* and *Pseudotsuga menziesii* in this macrogroup need some review of concepts in relation to other groups and macrogroups, including ~Central Rocky Mountain Mesic Grand Fir - Douglas-fir Forest Group (G211)$$ (in ~Central Rocky Mountain Mesic Lower Montane Forest Macrogroup (M500)$$) and ~East Cascades Mesic Grand Fir - Douglas-fir Forest Group (G212)$$ (placed in ~Vancouverian Lowland & Montane Forest Macrogroup (M024)$$). In PNV (PAGs) concept, this is mostly *Pseudotsuga menziesii*, moist *Pinus ponderosa* series, dry *Abies grandis*, or warm, dry *Abies lasiocarpa* series in the Canadian Rockies, northern Middle Rockies, eastern Cascades and Okanagan ecoregions. Everett et al. (2000) indicate that in the eastern Cascades of Washington, this group forms fire polygons due to abrupt north and south topography with presettlement fire-return intervals of 11-12 years typically covering less than 810 ha. Currently, fires have 40- to 45-year return intervals with thousands of hectares in size. ~East Cascades Mesic Grand Fir - Douglas-fir Forest Group (G212)$$ has a North Pacific floristic composition and is mostly found in the East Cascades ecoregion, peripheral in Okanagan ecoregion, and West Cascades. For now, this macrogroup does not include any *Abies grandis*-named associations. It may be that some of the drier end of *Abies grandis* forests should be included in this macrogroup, as they may well be mixed with *Pinus ponderosa* or *Pseudotsuga menziesii*.

Forests and woodlands of the middle Rocky Mountains dominated by *Pseudotsuga menziesii*, which are included in this macrogroup, need to be clarified as to placement; they are related to groups currently in other macrogroups; e.g. ~Central Rocky Mountain Mesic Grand Fir - Douglas-fir Forest Group (G211)$$ in ~Central Rocky Mountain Mesic Lower Montane Forest Macrogroup (M500)$$, and ~East Cascades Mesic Grand Fir - Douglas-fir Forest Group (G212)$$ in ~Vancouverian Lowland & Montane Forest Macrogroup (M024)$$. Also, its transition in the south to ~Southern Rocky Mountain White Fir - Douglas-fir Dry Forest Group (G226)$$ in ~Southern Rocky Mountain Lower Montane Forest Macrogroup (M022)$$ needs to be clarified. Certainly this macrogroup is outside the range of distribution of either *Picea pungens* or *Abies concolor*, which are major components of the southern Rocky Mountain forest macrogroup. It also does not overlap with major interior Pacific Northwest forest types which are affiliated with a more maritime climate regime, where trees such as *Tsuga heterophylla, Thuja plicata, Larix occidentalis, Abies grandis*, or *Pinus monticola* occur. The floristic "transition" from middle to southern Rocky Mountains is not yet clear. Woodlands dominated by *Pseudotsuga menziesii* found in breaks along rivers and on escarpments in central and eastern Montana and Wyoming are included in this macrogroup.

Regarding *Pinus ponderosa*, this macrogroup includes the northern race of Interior Ponderosa Pine old-growth (USFS Region 6, USFS Region 1). The FEIS site describes different varieties of *Pinus ponderosa* and associated species. This macrogroup of the Central Rockies is primarily *Pinus ponderosa var. ponderosa* (Habeck 1992). Johansen and Latta (2003) have mapped the distribution of two varieties (*Pinus ponderosa var. scopulorum* and *Pinus ponderosa var. ponderosa*) using mitochondrial DNA. They hybridize along the Continental Divide in Montana backing up the FEIS information. ~Southern Rocky Mountain Lower Montane Forest Macrogroup (M022)$$ includes forests and woodlands where *Pinus ponderosa var. scopulorum, Pinus ponderosa var. brachyptera*, and *Pinus arizonica var. arizonica* are the predominant ponderosa varieties. The transition between these two macrogroups (M501 and M022) is now defined to occur in the montane zones of the Bighorns (USFS section M331B) and Laramie Range (USFS section M331I) and to the east and south of these mountains. The southern Rocky Mountain macrogroup (M022) will also occur in other isolated mountain ranges of central Wyoming, but not in eastern Wyoming. It does not occur farther north than Wyoming; all western Montana ponderosa pine woodlands are placed into this macrogroup (M501). Ponderosa pine woodlands and "steppes" in eastern Wyoming, eastern and central Montana, including the Missouri River Breaks, are also included in this macrogroup, and are predominantly *Pinus ponderosa var. scopulorum*. Ponderosa pine woodlands found in the Great Plains do show some floristic similarities to these found within the forested mountains of the Southern Rockies, but typically have herbaceous floristics related to the Great Plains "mixedgrass." The southern extent of the ponderosa pine woodlands included in this macrogroup is hard to determine, but farther south in Colorado, there is more *Juniperus, Pinus edulis*, and *Quercus gambelii*. Stands of ponderosa pine at Black Mesa in western Oklahoma and in southeastern Colorado are currently included with the southern Rocky Mountain ponderosa pine woodlands in M022. South of the Modoc Plateau in California, *Pinus ponderosa* forests and woodlands are included in ~Southern Vancouverian Montane-Foothill Forest Macrogroup (M023)$$.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M022 | Southern Rocky Mountain Lower Montane Forest | includes forests and woodlands where *Pinus ponderosa var. scopulorum, Pinus ponderosa var. brachyptera*, and *Pinus arizonica var. arizonica* are the predominant ponderosa varieties. |
| M020 | Rocky Mountain Subalpine-High Montane Forest |  |
| M500 | Central Rocky Mountain Mesic Lower Montane Forest |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: These are physiognomically variable conifer forests, woodlands or savannas, ranging from very sparse patches of trees on drier sites, to nearly closed-canopy forest stands on north slopes or in draws where available soil moisture is higher. They can have grassy or shrubby understories. In places these are patchy woodlands dominated by relatively short conifers (scrub woodlands). Occasionally broad-leaved deciduous trees are intermixed with the conifers in mesic settings, or as seral components. Shrubs can be broad-leaved deciduous, or needle-leaved or microphyllous evergreen (sagebrush), while the graminoids are primarily bunch grasses, along with rhizomatous grasses. Understories are generally low to moderate in cover, especially in the most droughty and rocky sites. In some cases due to a climate-edaphic interaction, the structure is that of widely scattered trees over "shrub-steppe" of *Artemisia* spp., *Purshia tridentata*, or sparsely distributed grasses.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: In the northwestern Great Plains, the tree canopy is primarily dominated by *Pinus ponderosa var. scopulorum* but may include a sparse to relatively dense understory of *Juniperus scopulorum* or *Cercocarpus* with just a few scattered trees. Deciduous trees are an important component in some areas (western Dakotas, Black Hills) and are sometimes codominant with the pines, including *Acer negundo, Betula papyrifera, Fraxinus pennsylvanica, Populus tremuloides, Quercus macrocarpa*, and *Ulmus americana*. Important or common shrub species with ponderosa pine can include *Amelanchier alnifolia, Arctostaphylos uva-ursi, Juniperus communis, Juniperus horizontalis, Mahonia repens, Physocarpus monogynus, Prunus virginiana, Rhus trilobata, Symphoricarpos* spp., and *Yucca glauca*. The herbaceous understory is variable and can range from a sparse to dense layer with species typifying the surrounding prairie group, with mixedgrass species common, such as *Andropogon gerardii, Bouteloua curtipendula, Carex inops ssp. heliophila, Carex filifolia, Koeleria macrantha, Nassella viridula, Oryzopsis asperifolia, Pascopyrum smithii, Piptatheropsis micrantha (= Piptatherum micranthum)*, and *Schizachyrium scoparium*. Higher-elevation stands often have herbaceous species more typical of the Rocky Mountains such as *Achillea millefolium, Antennaria rosea, Balsamorhiza sagittata, Cerastium arvense, Danthonia intermedia, Fragaria* spp., *Galium boreale, Pulsatilla patens*, and *Lathyrus ochroleucus*.

Further west, *Pinus ponderosa*-dominated woodlands include two physiognomic phases: true woodlands of *Pinus ponderosa* with shrubby or grassy understories, and "wooded steppes" with widely spaced, scattered *Pinus ponderosa* trees over generally shrubby but sparse understories. The former are generally fire-maintained, while the later are often too dry and with widely spaced vegetation to carry fire. *Pinus ponderosa var. ponderosa* is the predominant conifer (west of the Continental Divide); *Pseudotsuga menziesii* or *Pinus flexilis* may be present in the tree canopy but are usually absent. The understory can be shrubby, with *Amelanchier alnifolia, Arctostaphylos patula, Arctostaphylos uva-ursi, Ceanothus velutinus, Cercocarpus ledifolius, Physocarpus malvaceus, Purshia tridentata, Rosa* spp., *Symphoricarpos oreophilus* or *Symphoricarpos albus*, and *Vaccinium cespitosum* common species. In transition areas with big sagebrush steppe, *Artemisia arbuscula, Artemisia tridentata ssp. tridentata, Artemisia tridentata ssp. wyomingensis, Artemisia tripartita*, and *Purshia tridentata* may be common in fire-protected sites such as rocky areas. Deciduous shrubs, such as *Physocarpus malvaceus, Symphoricarpos albus*, or *Spiraea betulifolia*, can be abundant in more northerly sites or more moist climates. Understory vegetation in the true savanna occurrences is predominantly fire-resistant grasses and forbs that resprout following surface fires; shrubs, understory trees and downed logs are uncommon. These more open stands support grasses such as *Achnatherum* spp., dry *Carex* species (*Carex inops*), *Festuca campestris, Festuca idahoensis, Hesperostipa* spp., or *Pseudoroegneria spicata*. More mesic sites may include *Calamagrostis rubescens* or *Carex geyeri*, species more typical of the higher elevation Douglas-fir - pine forests.

In the Central Rockies forests are typically dominated by a mix of *Pseudotsuga menziesii* and *Pinus ponderosa* in the tree canopy, although either can be absent. Other seral trees may occur, including *Pinus contorta, Pinus monticola*, and *Larix occidentalis* (neither in central Montana). *Picea engelmannii* (or *Picea glauca* or their hybrid) becomes increasingly common to the east. In the eastern Cascades, *Pinus contorta* may be the codominant pine, rather than *Pinus ponderosa*. *Abies grandis* (a fire-sensitive, shade-tolerant species not occurring in central Montana) has increased on many sites once dominated by *Pseudotsuga menziesii* and *Pinus ponderosa*, which were formerly maintained by low-severity wildfire. *Abies concolor* and *Abies grandis x concolor* hybrids in central Idaho (the Salmon Mountains) may occur in some stands, but have very restricted ranges in this area. *Abies concolor* and *Abies grandis* in the Blue Mountains of Oregon are probably hybrids of the two and mostly *Abies grandis*. Understories are typically dominated by graminoids, such as *Calamagrostis rubescens, Carex geyeri, Carex rossii*, and *Pseudoroegneria spicata*, and a variety of shrubs, such as *Acer glabrum, Juniperus communis, Physocarpus malvaceus, Symphoricarpos albus, Spiraea betulifolia*, or *Vaccinium membranaceum* on mesic sites.

The foothill-rock outcrop limber pine - juniper woodlands are dominated by *Pinus flexilis, Juniperus osteosperma*, or *Juniperus scopulorum*. *Pinus edulis* is not present. A sparse to moderately dense short-shrub layer, if present, may include a variety of shrubs, such as *Artemisia nova, Artemisia tridentata, Cercocarpus ledifolius, Cercocarpus montanus, Ericameria nauseosa, Juniperus horizontalis, Purshia tridentata, Rhus trilobata*, or *Rosa woodsii*. Herbaceous layers are generally sparse, but range to moderately dense, and are typically dominated by perennial graminoids such as *Bouteloua gracilis, Hesperostipa comata, Koeleria macrantha, Leymus innovatus* (in Alberta), *Piptatheropsis micrantha, Poa secunda, Pseudoroegneria spicata*, or *Schizachyrium scoparium*.

In the middle Rocky Mountains are found extensive *Pseudotsuga menziesii* forests, occasionally with *Pinus flexilis* on calcareous substrates, and *Pinus contorta* at higher elevations. True firs, such as *Abies concolor, Abies grandis*, and *Abies lasiocarpa*, are generally absent in these occurrences, but *Picea engelmannii* can occur in some stands. *Pinus ponderosa* is also not common in this region. Understory components include shrubs such as *Amelanchier alnifolia, Juniperus communis, Linnaea borealis, Mahonia repens, Physocarpus malvaceus, Purshia tridentata, Spiraea betulifolia, Symphoricarpos oreophilus*, and *Symphoricarpos albus*. Common graminoids include *Calamagrostis rubescens, Carex rossii*, and *Leucopoa kingii*. Forbs are variable, but typical taxa include *Arnica cordifolia, Osmorhiza berteroi, Thalictrum occidentale, Viola adunca*, and species of many other genera, including *Arenaria, Erigeron, Fragaria, Galium, Lathyrus, Lupinus, Penstemon, Vicia*, and others. These Douglas-fir forests often occur at the lower treeline immediately above valley grasslands, or sagebrush steppe and shrublands. Sometimes there may be a "bath-tub ring" of *Pinus ponderosa* at lower elevations or *Pinus flexilis* between the valley non-forested and the solid *Pseudotsuga menziesii* forest. In the Wyoming Basins, there are isolated stands of *Pseudotsuga menziesii*, with *Artemisia tridentata, Pseudoroegneria spicata, Leucopoa kingii*, and *Carex rossii*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Most of the communities in this macrogroup are fire-dependent types. Presettlement fire regimes may have been characterized by frequent, low-intensity surface fires that maintained relatively open stands of a mix of fire-resistant species. *Pseudotsuga menziesii* forests were probably subject to a moderate-severity fire regime in presettlement times, with fire-return intervals of 30-100 years. Many of the important tree species in these forests and woodlands are fire-adapted (*Populus tremuloides, Pinus ponderosa, Pinus contorta*) (Pfister et al. 1977), and fire-induced reproduction of *Pinus ponderosa* can result in its continued codominance in *Pseudotsuga menziesii* forests (Steele et al. 1981).

A subset of the macrogroup includes woodlands and scrub patches that are edaphically controlled rather than fire-dependent. In the limber pine - juniper woodlands, fire is infrequent and spotty because the rocky substrates prevent development of a continuous vegetation canopy needed to spread fire. In other locations, where ponderosa is the predominant tree, periodic drought limits tree establishment. This climate-edaphic interaction results in widely scattered trees over "shrub-steppe" of sagebrush, bitterbrush, or sparsely distributed grasses. Tree growth is likely episodic, with regeneration episodes in years with available moisture. Tree density is limited in some areas by available growing space due to rocky conditions of the site. Hence the tree canopy in these locations will never reach woodland density or close due to the interaction of climate and edaphic factors, even in the absence of fire. They burn occasionally, but the vegetation is sparse enough that fires are typically not carried through the stand. Fire frequency is speculated to be 30-50 years. Some stands also occur on areas of sand dunes, scablands, and pumice where the edaphic conditions limit tree abundance.

*Pinus ponderosa* is a drought-resistant, shade-intolerant conifer which usually occurs at lower treeline in the major ranges of the western United States. Historically, surface fires and drought were influential in maintaining open-canopy conditions in these woodlands. With settlement and subsequent fire suppression, occurrences have become denser. Presently, some occurrences contain understories of more shade-tolerant species, such as *Pseudotsuga menziesii* and/or *Abies* spp., as well as younger cohorts of *Pinus ponderosa*. These altered structures have affected fuel loads and fire regimes. Presettlement fire regimes were primarily frequent (5- to 15-year return intervals), low-intensity surface fires triggered by lightning strikes or deliberately set by Native Americans. With fire suppression and increased fuel loads, fire regimes are now less frequent and often become intense crown fires, which can kill mature *Pinus ponderosa* (Reid et al. 1999). Establishment is erratic and believed to be linked to periods of adequate soil moisture and good seed crops as well as fire frequencies, which allow seedlings to reach sapling size. Longer fire-return intervals have resulted in many occurrences having dense subcanopies of overstocked and unhealthy young *Pinus ponderosa*, along with *Pseudotsuga menziesii* on moist sites (Reid et al. 1999).

A meeting of Pacific Northwest ecologists for Landfire concluded that the "true savannas" of high-frequency / low-intensity fires and grassy understories are now rare in the central and northern Rocky Mountains. Most areas that may have been savanna in the past are now more nearly closed-canopy woodlands/forests. Louisa Evers (pers. comm. 2006) notes that she has not found any evidence that ponderosa pine savanna existed historically in north-central and central Oregon. In north-central Oregon, the savanna would have been oak or pine-oak. In central Oregon, it may well have been western juniper. Condition surveys of the Cascades Forest Reserve and General Land Office survey notes suggest that ponderosa pine formed a woodland with grassy understories, but still was often referred to as open-parklike.

In mixed stands of *Pinus ponderosa* and *Pseudotsuga menziesii*, presettlement fire regimes may have been characterized by frequent, low-intensity surface fires that maintained relatively open stands of a mix of fire-resistant species. Under present conditions, the fire regime is mixed-severity and more variable, with stand-replacing fires more common, and the forests are more homogeneous. With vigorous fire suppression, longer fire-return intervals are now the rule, and multi-layered stands of *Pseudotsuga menziesii, Pinus ponderosa*, and/or *Abies grandis* provide fuel "ladders," making these forests more susceptible to high-intensity, stand-replacing fires. They are productive forests which have been priorities for timber production.

Successional relationships in the middle Rocky Mountain *Pseudotsuga menziesii* forests are complex. *Pseudotsuga menziesii* is less shade-tolerant than many northern or montane trees such as *Tsuga heterophylla, Abies concolor, Picea engelmannii*, or *Thuja plicata*, and seedlings compete poorly in deep shade. At drier locales, seedlings may be favored by moderate shading, such as by a canopy of *Pinus ponderosa*, which helps to minimize drought stress. In some locations, much of these forests were logged or burned during European settlement, and present-day stands are second-growth forests dating from fire, logging, or other stand-replacing disturbances (Mauk and Henderson 1984). *Pseudotsuga menziesii* forests were probably subject to a moderate-severity fire regime in presettlement times, with fire-return intervals of 30-100 years. Many of the important tree species in these forests are fire-adapted (*Populus tremuloides, Pinus ponderosa, Pinus contorta*) (Pfister et al. 1977), and fire-induced reproduction of *Pinus ponderosa* can result in its continued codominance in *Pseudotsuga menziesii* forests (Steele et al. 1981). Seeds of the shrub *Ceanothus velutinus* can remain dormant in forest stands for 200 years (Steele et al. 1981) and germinate abundantly after fire, competitively suppressing conifer seedlings. Some stands may have higher tree-stem density than historically, due largely to fire suppression.

Marriot and Faber-Langendoen (2000) report different fire regimes for ponderosa pine communities in the Black Hills, with their "Dry Group" more typically having frequent surface fires and the "Mesic Group" having infrequent catastrophic fires (every 100-200 years). The Dry Group of associations includes lower elevation foothill savanna associations, and the mesic group somewhat higher elevation, north-slope, swale associations. Kelly Kindscher (pers. comm. 2007) believes that almost all of the stands in Nebraska were there at the time of settlement and are not a result of pine expansion due to fire suppression; in addition, at least some have disappeared, such as the one in southern Nebraska (Franklin County). It is possible, however, that some areas of Great Plains ponderosa have expanded in size due to fire suppression, but this needs substantiation.

ENVIRONMENT

Environmental Description: This is a very wide-ranging macrogroup; it has common substrate and soil characteristics across its range, but from west to east shifts from a climate regime moderately influenced by maritime air masses, to one that is entirely continental. The below summary of environmental characteristics has been split into 2 components, one for the "interior Pacific Northwest," the second for the component generally found east of the Continental Divide.

This macrogroup within the interior Pacific Northwest and Central Rockies regions often occurs at the lower treeline/ecotone between grasslands or shrublands and more mesic coniferous forests. Typically these plant communities are found in warm, dry, exposed sites at elevations ranging from 350 m in British Columbia to over 2400 m (1500-7875 feet) in the Wyoming Rockies. These interior Pacific Northwest woodlands receive winter and spring rains, and thus have a greater spring "green-up" than the drier woodlands in the Southern Rockies. In the middle Rocky Mountains, *Pseudotsuga menziesii* forests occur under a comparatively drier and more continental climate regime, and at higher elevations than in the coastal Pacific Northwest. However, these sites are often too droughty to support a closed tree canopy. They can occur on all slopes and aspects; often they occur on moderately steep to very steep slopes or ridgetops and plateaus. Lower elevation stands often occupy protected northern exposures or mesic ravines and canyons, often on steep slopes. At higher elevations, these forests occur primarily on southerly aspects or ridgetops and plateaus. Soils are highly variable and derived from diverse parent materials.

*Climate:* These interior Pacific Northwest woodlands receive winter and spring rains, and thus have a greater spring "green-up" than the drier woodlands in the Southern Rockies. The southern / southwestern monsoon influence is less and maritime climate regime is not important. Annual precipitation ranges from 50-100 cm with moderate snowfall and a greater proportion falling during the growing season. Monsoonal summer rains can contribute a significant proportion of the annual precipitation in the southern portion of the range. Winter snowpacks typically melt off in early spring at lower elevations.

*Soil/substrate/hydrology:* These sites are often too droughty to support a closed tree canopy. They can occur on all slopes and aspects; however, they commonly occur on moderately steep to very steep slopes or ridgetops and plateaus. Substrates include glacial till, glacio-fluvial sand and gravel, dunes, basaltic rubble and scablands, colluvium, or deep loess or volcanic ash-derived soils, all with characteristic features of good aeration and drainage, coarse textures, circumneutral to slightly acidic pH, an abundance of mineral material, rockiness, and periods of drought during the growing season. In the Oregon "pumice zone" stands occur as matrix-forming, extensive woodlands on rolling pumice plateaus and other volcanic deposits. *Pseudotsuga menziesii* forests are reported by most studies (Pfister et al. 1977, Steele et al. 1981, Mauk and Henderson 1984, Lillybridge et al. 1995) to show no particular affinities to geologic substrates.

The ponderosa pine, limber pine and juniper communities found in the northwestern Great Plains and along the foothills of the Rocky Mountains to the east of the Continental Divide occur in foothill and lower montane zones. Generally they occur on gentle to steep slopes along escarpments, buttes, canyons, rock outcrops or ravines and can grade into one of the Great Plains canyon groups or the surrounding mixedgrass prairie. Slopes are typically moderately steep to steep. In Montana, limber pine is restricted at low elevations to limestone outcrops. The *Pinus ponderosa* woodlands of the western Great Plains are found typically in the matrix of Great Plains grassland systems. They are often surrounded by mixedgrass or tallgrass prairie, in places where available soil moisture is higher or soils are more coarse and rocky. In some cases, these woodlands or savannas may occur where fire suppression has allowed trees to become established (in areas where deciduous trees are more abundant (Girard et al. 1987). These are typically not in the same setting as Rocky Mountain ponderosa pine, where ponderosa pine forms woodlands at lower treeline and grades into mixed montane conifer systems at higher elevations.

*Climate:* Climatologically, the region east of the Continental Divide is semi-arid and has a continental regime of hot summers and cold winters. High winds are a common feature found to the east of the Continental Divide and out in the Great Plains; limber pine is adapted to these winds with highly flexible branches which prevent breakage. Precipitation patterns are variable, but snow is common in winter, and spring rains are an important contributor.

*Soil/substrate/hydrology:* The *Pinus flexilis* and *Juniperus* spp. communities are restricted to shallow soils and fractured bedrock derived from a variety of parent material, including limestone, sandstone, dolomite, granite, and colluvium. An unusual community in Idaho occurs on relatively unweathered mafic lava flows, where it occurs in mesic pockets within the fractured lava. In all cases, soils have a high rock component (typically over 50% cover) and are coarse- to fine-textured, often gravelly and calcareous. Slopes are typically moderately steep to steep. Soils of the *Pinus ponderosa* woodlands range from well-drained loamy sands to sandy loams formed in colluvium, weathered sandstone, limestone, scoria or eolian sand.

DISTRIBUTION

\*Geographic Range: This widespread macrogroup occurs in Canada in southern British Columbia in the Fraser River drainage and eastward in valleys that drain into the Columbia and Kootenay rivers, and in southwestern Alberta east of the Continental Divide. Southward into the U.S. it occurs along the Cascades and central Rocky Mountains of Washington, Oregon and the Modoc Plateau of northeastern California. It also is found throughout the middle Rocky Mountains of central and southern Idaho (Lemhi, Beaverhead and Lost River ranges), south and east into the Greater Yellowstone region, and south and east into the Wind River, Gros Ventre and Bighorn ranges of Wyoming. In the northeastern part of its range, it extends across the central Rocky Mountains west of the Continental Divide into western Montana, south to the Snake River Plain in Idaho, and east of the Continental Divide into the foothills of west-central Montana. It extends east into the "sky island" ranges of central Montana, and from there east into the northwestern Great Plains along areas that border the Rocky Mountains and into the central Great Plains in a few scattered localities. Some associations placed in this macrogroup also occur in Colorado and northeastern Utah in the Uinta Mountains.

Nations: CA, US

States/Provinces: AB, BC, CA, CO, ID, KS?, MT, ND, NE, NV?, OR, SD, UT, WA, WY

USFS Ecoregions (2007) [optional]: 331A:CC, 331C:C?, 331D:CC, 331E:CC, 331F:CC, 331G:CC, 331H:CC, 331K:CC, 331L:CC, 331M:CC, 331N:CC, 332A:C?, 332B:C?, 332C:CC, 332D:C?, 332E:C?, 341G:PP, 342A:CC, 342B:CC, 342C:CC, 342D:CC, 342E:CC, 342F:CC, 342G:CC, 342H:CC, 342I:CC, 342J:CP, M242B:CC, M242C:CC, M242D:CC, M261G:CC, M331A:CC, M331B:CC, M331D:CP, M331E:CC, M331I:CC, M331J:CC, M332A:CC, M332B:CC, M332D:CC, M332E:CC, M332F:CC, M332G:CC, M333A:CC, M333B:CC, M333C:CC, M333D:CC, M334A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: While there is justification for a macrogroup representing the drier, lower montane forests and woodlands of the central and Canadian Rockies, there are certainly classification issues pertaining to the groups within this macrogroup.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G213 | Central Rocky Mountain Ponderosa Pine Open Woodland |
| G210 | Central Rocky Mountain Douglas-fir - Pine Forest |
| G215 | Middle Rocky Mountain Montane Douglas-fir Forest & Woodland |
| G209 | Rocky Mountain Foothill-Rock Outcrop Limber Pine - Juniper Woodland |
| G216 | Black Hills-Northwestern Great Plains Ponderosa Pine Forest & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-07-23 | M018 Northern Rocky Mountain Sub-Boreal & Montane Forest Macrogroup | M018 was merged into M017; subsequently M017 split into M500 & M501 |
| 2012-07-23 | M017 Central Rocky Mountain Lower Montane & Foothill Forest Macrogroup | M017 split into M500 & M501 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Black Hills pine forest (*Pinus*) | Küchler 1964 |  |
| < | Douglas-fir forest (*Pseudotsuga*) | Küchler 1964 |  |
| < | Eastern ponderosa forest (*Pinus*) | Küchler 1964 |  |
| >< | Interior Douglas-fir: 210 | Eyre 1980 |  |
| >< | Interior Ponderosa Pine: 237 | Eyre 1980 |  |
| >< | Limber Pine: 219 | Eyre 1980 |  |
| >< | Ponderosa Pine - Grassland (110) | Shiflet 1994 |  |
| >< | Ponderosa Pine - Shrubland (109) | Shiflet 1994 |  |
| >< | Rocky Mountain Juniper: 220 | Eyre 1980 |  |
| < | Western ponderosa forest (*Pinus*) | Küchler 1964 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M.S. Reid

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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1. Forest & Woodland

1.B.2.Nb. Rocky Mountain Forest & Woodland

M500. Central Rocky Mountain Mesic Lower Montane Forest

Type Concept Sentence: Mesic to moist conifer forests and woodlands of the lower montane zone of the central Rocky Mountains and interior Pacific Northwest, including the eastern Cascades. *Abies grandis, Larix occidentalis, Pseudotsuga menziesii, Thuja plicata*, or *Tsuga heterophylla* are the major dominants.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Nb. Rocky Mountain Forest & Woodland (D194)

Elcode: M500

\*Scientific Name: *Tsuga heterophylla - Abies grandis - Larix occidentalis* Lower Montane Forest Macrogroup

\*Common (Translated Scientific) Name: Western Hemlock - Grand Fir - Western Larch Mesic Lower Montane Forest Macrogroup

\*Colloquial Name: Central Rocky Mountain Mesic Lower Montane Forest

\*Type Concept: This macrogroup encompasses mesic conifer forests and woodlands of the lower montane zone of the central Rocky Mountains and interior Pacific Northwest, including the eastern Cascades. *Abies grandis, Larix occidentalis, Pseudotsuga menziesii, Thuja plicata*, or *Tsuga heterophylla* are the major dominants. *Abies lasiocarpa, Picea engelmannii, Picea engelmannii x glauca* hybrids, *Picea glauca, Pinus contorta*, and *Pinus monticola* are major associates. *Pinus ponderosa* may be present but only on the warmest and driest sites. Deciduous hardwood species occur, but typically are not dominant; they include *Populus tremuloides* and *Betula papyrifera*. This macrogroup is found in the Rocky Mountains of western Montana west through northern Idaho into northeastern Washington and southern and central British Columbia, and south into the northwestern Blue Mountains of Oregon. Although in a continental climate, these forests are influenced by incursions of mild, wet, Pacific maritime air masses. Snow occurs throughout the macrogroup, but can be modified by warmer Pacific air masses even in the winter, or in the southern range, melted by rain during warm winter storms. Elevations range from 100 to 2195 m (300-7200 feet). In the Cascades, this macrogroup occurs on the upper east slopes in Washington, south of Lake Chelan and south to Mount Hood in Oregon. Occurrences are generally found on all slopes and aspects but grow best on sites with high soil moisture, such as valley bottoms, on benches, well-drained slopes, toeslopes and moist ravines. Sites supporting these forests are typically warmer and moister than the prevailing local climate. However, these are moist, non-flooded or upland sites that are not saturated year-long. At the periphery of its distribution, this macrogroup is confined to moist canyons and cooler, moister aspects. These mesic and productive forests tend to have long fire-return intervals, ranging from 150 to over 500 years for stand-replacing fires, and with moderate-severity fire intervals of 50-100 years. Gap dynamics are important in older stands. Disturbance regimes are not well-documented for the montane white spruce forests, but likely include periodic windthrow as well as fire spreading from adjacent, drier forests and woodlands. *Larix occidentalis* woodlands are maintained post-establishment by frequent, low-severity surface fires.

\*Diagnostic Characteristics: These productive and diverse forests dominated by *Tsuga heterophylla* and/or *Thuja plicata* in most cases are found in the interior of the Pacific Northwest, in areas under a continental climate but influenced somewhat by incursions of mild, wet, Pacific maritime air masses. Floristic affinities are with the Rocky Mountains. Some of these forests may persist for centuries, having fire-return intervals over 500 years. Other trees present can include *Abies lasiocarpa, Picea engelmannii x glauca* hybrids, *Pinus contorta, Pinus ponderosa, Populus tremuloides*, and *Pseudotsuga menziesii*. Mesic conifer forests of the central Rocky Mountains, where *Abies grandis, Pseudotsuga menziesii*, or *Larix occidentalis* are the major dominants.

\*Classification Comments: Information on this macrogroup needs to be better integrated across the northwestern U.S., British Columbia and Alberta. The biogeographic line between this macrogroup and ~Vancouverian Lowland & Montane Forest Macrogroup (M024)$$ needs to be more clearly determined, as there is a convergence of Rocky Mountain and east-side Cascadian floristics in the East Cascades and north into British Columbia.

~Central Rocky Mountain Mesic Grand Fir - Douglas-fir Forest Group (G211)$$ in this macrogroup should be considered for merging with ~East Cascades Mesic Grand Fir - Douglas-fir Forest Group (G212)$$ in M024; they share a number of floristic similarities, along with some differences. But perhaps those differences would be better handled as alliance-level distinctions. This needs review.

*Tsuga heterophylla* is a major tree species in the Pacific Northwest, and it is an important species in M024. This macrogroup contains western hemlock and western red-cedar associations that are confined to the interior regions of the Northwest. Certainly, there are some floristic similarities between the Northern Rockies types and those found west of the Cascades. However, there's a distinct "Rocky Mountain" set of species, i.e., *Anemone piperi, Aralia nudicaulis, Coptis occidentalis*, found in the Rocky Mountains. Further information needs to be included here for interior western hemlock and western red-cedar forests of British Columbia.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M501 | Central Rocky Mountain Dry Lower Montane-Foothill Forest |  |
| M024 | Vancouverian Coastal Rainforest | shares some of the dominant tree species (especially the grand fir-Douglas-fir forests of the east Cascades in G212); but associated shrub and herb composition is somewhat different. |

Similar NVC Types General Comments [optional]: Species in East Cascades forests (G212) that are absent to rare in the Northern Rockies are *Abies amabilis, Acer circinatum, Acer macrophyllum, Achlys triphylla, Anemone deltoidea, Anemone oregana, Blechnum spicant, Gaultheria shallon, Mahonia nervosa, Oxalis oregana, Picea sitchensis, Rhododendron macrophyllum, Rubus lasiococcus, Rubus spectabilis, Streptopus streptopoides, Vaccinium alaskaense*, and *Vaccinium parvifolium*.

VEGETATION

Physiognomy and Structure Summary: Generally, these are productive forests, ranging from closed-canopy to more open "savanna-like" woodlands. Composed of [usually] tall, long-lived, needle-leaved evergreen trees, sometimes composed of just one tree species, but more often are of mixed composition. Deciduous hardwoods intermingle in some occurrences; deciduous conifers are dominant in some areas. Deciduous tall and short shrubs, and perennial graminoids, forbs or ferns often form shrub and herbaceous layers, respectively. Often there is high cover of mosses. Some occurrences may lack the shrub layer. Some of these forests are the most diverse of any Rocky Mountain forest, sometimes approaching or equaling the within-stand diversity of some eastern North American forests, but the diversity resides in the shrub and herb taxa, not the trees.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: In the grand fir - Douglas-fir zone, *Abies grandis* is dominant and *Pseudotsuga menziesii* commonly shares the canopy. *Abies lasiocarpa, Larix occidentalis, Picea engelmannii, Pinus contorta*, and *Pinus monticola* are major associates. On most mesic sites, intermediate to older age stands may support some *Thuja plicata* and *Tsuga heterophylla* in the overstory. In other locations, *Tsuga heterophylla* and *Thuja plicata* are the dominants, while *Pseudotsuga menziesii* and *Abies grandis* commonly share the canopy, and *Pinus monticola, Pinus contorta, Abies lasiocarpa*, and *Larix occidentalis* are major associates. *Picea engelmannii* and *Abies lasiocarpa* may be present but only on the coldest sites, and *Pinus ponderosa* may be present but only on the warmest and driest sites or mid-seral, post-fire sites. In central British Columbia, *Tsuga heterophylla* and/or *Thuja plicata* are the dominants and are generally associated with some *Picea glauca x engelmannii, Abies lasiocarpa*, or *Pseudotsuga menziesii*. Deciduous hardwood species occur, but typically are not dominant; they include *Populus tremuloides* and *Betula papyrifera*.

Common shrubs include *Acer glabrum, Amelanchier alnifolia, Cornus nuttallii, Mahonia nervosa, Menziesia ferruginea, Paxistima myrsinites, Rosa gymnocarpa, Rubus parviflorus, Spiraea betulifolia, Symphoricarpos albus, Symphoricarpos hesperius, Taxus brevifolia*, and *Vaccinium membranaceum*. *Oplopanax horridus* is common in the understory in depressional areas with high water tables. Composition of the herbaceous layer reflects local climate and degree of canopy closure; it is typically highly diverse in all but closed-canopy conditions. *Aralia nudicaulis, Clintonia uniflora, Linnaea borealis, Tiarella trifoliata, Viola orbiculata, Cornus canadensis*, and *Xerophyllum tenax* are common forbs in these forests. Other forbs include *Actaea rubra, Adenocaulon bicolor, Anemone piperi, Arnica latifolia, Coptis occidentalis, Galium triflorum, Goodyera oblongifolia, Orthilia secunda, Prosartes hookeri (= Disporum hookeri), Streptopus amplexifolius, Thalictrum occidentale*, and *Trillium ovatum*. In the eastern Cascades, *Acer circinatum, Achlys triphylla, Anemone deltoidea, Chrysolepis chrysophylla*, and *Vancouveria hexandra* are more common. Graminoids usually form a very minor component and typically include *Bromus vulgaris* and minor amounts of *Carex deweyana, Carex geyeri, Elymus glaucus, Festuca subulata*, and *Oryzopsis asperifolia*. Ferns and fern allies also form an important component of the understory in many occurrences and commonly include *Athyrium filix-femina, Botrychium* spp., *Dryopteris filix-mas, Dryopteris expansa (= Dryopteris assimilis), Equisetum* spp., and *Gymnocarpium dryopteris*. Under closed-canopy conditions, a dense moss layer can form on the forest floor.

This macrogroup also includes woodlands or "savannas" of the deciduous conifer *Larix occidentalis*. Important low-growing shrubs include *Arctostaphylos uva-ursi, Spiraea betulifolia*, and *Vaccinium cespitosum*; taller shrubs can include *Acer glabrum, Ceanothus velutinus, Physocarpus malvaceus, Rubus parviflorus, Shepherdia canadensis*, or *Vaccinium membranaceum*. Herbaceous species include *Calamagrostis rubescens, Clintonia uniflora, Linnaea borealis*, or *Xerophyllum tenax*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: These mesic and productive forests tend to have long fire return-intervals, ranging from 150 to over 500 years for stand-replacing fires, and with moderate-severity fire intervals of 50-100 years. Gap dynamics are important in older stands. *Larix occidentalis* woodlands are maintained post-establishment by frequent, low-severity surface fires.

*Abies grandis* forests include many sites dominated by *Pseudotsuga menziesii* and *Pinus ponderosa* which were formerly maintained by wildfire, and may now be dominated by *Abies grandis* (a fire-sensitive, shade-tolerant species) due to fire exclusion (Lillybridge et al. 1995, Chappell et al. 1997). Pre-European settlement fire regimes of grand fir - Douglas-fir forests were typically of frequent, low-intensity surface fires, maintaining relatively open stands of a mix of fire-resistant species. With the advent of effective fire suppression, longer fire-return intervals are now the rule, and mixed-stature stands with *Abies grandis* in various size classes now create ladder fuels making these forests more susceptible to high-intensity, stand-replacing fires (Cooper et al. 1987, Lillybridge et al. 1995).

*Larix occidentalis* is a long-lived species (in excess of 700 years in the northern Rocky Mountains), and thus stands of western larch are themselves persistent. However, the life of *Larix*-dominated stands probably rarely exceeds 250 years due to various mortality sources and the in-growth of shade-tolerant species, especially on mesic sites. Occurrences of *Larix occidentalis* stands are generated by stand-replacing fire, the fire-return interval for which is speculated to be approximately 80 to 200 years (Cooper et al. 1987), but are maintained by a higher frequency, surface-fire regime. Fire suppression has led to invasion of the more shade-tolerant tree species *Abies grandis, Abies lasiocarpa, Picea engelmannii*, or *Tsuga* spp. and loss of much of the single-story canopy woodlands. *Larix occidentalis* communities occur in settings where low-intensity, high-frequency fires create open larch woodlands. These sites may be maintained in a seral status for hundreds of years since *Larix occidentalis* is a long-lived species and the understory is often dominated by *Pseudotsuga*, which will grow into the upper canopy. The potential dominants, typically *Abies lasiocarpa, Picea engelmannii*, and/or *Abies grandis* or rarely *Tsuga heterophylla* or *Thuja plicata*, establish and grow on these sites, presenting the distinct probability, given the fire-return intervals for this type, that the "climax" (long-term stable) condition is never attained. It has been noted in northern Idaho that, following disturbance (particularly logging) in some mesic-site occurrences, *Larix occidentalis* does not necessarily replace itself, the first tree-dominated successional stages being dominated by *Pseudotsuga menziesii, Pinus contorta*, or less frequently by more shade-tolerant species (Cooper et al. 1987); this response is a consequence of the episodic nature of favorable cone crop years in *Larix occidentalis*.

The western red-cedar - western hemlock forests are very productive forests which have been priority stands for timber production. Typically, stand-replacement fire-return intervals are 150-500 years in the Cascades, or 150-500 years in the Northern Rockies, with moderate-severity fire-return intervals of 50-100 years. *Thuja* and *Tsuga* are capable of remaining dominant within these forests due to their longevity and *Thuja*'s ability to regenerate vegetatively. In the absence of disturbance, both species continue to regenerate under shaded conditions. Under closed-canopy conditions, both species favor vegetative reproduction over sexual reproduction, thus intermediate and young trees are found under these conditions.

ENVIRONMENT

Environmental Description: These forests occur in areas of continental climate that are influenced somewhat by incursions of mild, wet, Pacific maritime air masses. Snow occurs throughout the macrogroup, but can be modified by warmer Pacific air masses even in the winter, or in the southern range, melted by rain during warm winter storms. Elevations range from as low as 400 m in southeastern British Columbia and 100 m along the Skeena River in northwestern British Columbia to 2195 m (2000-7200 feet). In the Cascades, it occurs on the upper east slopes in Washington, south of Lake Chelan and south to Mount Hood in Oregon. Elevations in the Cascades range from 610 to 1220 m (2000-4000 feet) in a very restricted range occupying less than 5% of the forested landscape in the East Cascades. Occurrences generally are found on all slopes and aspects but grow best on sites with high soil moisture, such as valley bottoms, on benches, well-drained slopes, toeslopes and moist ravines. However, these are moist, non-flooded or upland sites that are not saturated yearlong. At the periphery of its distribution, this macrogroup is confined to moist canyons and cooler, moister aspects. This macrogroup differs from those found west of the Cascades in having lower overall precipitation, warmer summer and colder winter temperatures, and more frequent fire (Goward and Spribille 2005).

*Climate:* This forest macrogroup is found in areas of continental temperate climate that are influenced to varying degrees by incursions of mild, wet, Pacific maritime air masses. Snow occurs throughout the macrogroup, but can be modified by warmer Pacific air masses even in the winter, or in the southern range, melted by rain during warm winter storms. In the eastern Cascades, these forests are associated with a submesic climate regime with annual precipitation ranging from 100 to 200 cm (40-80 inches) and maximum winter snowpacks that typically melt off in spring at lower elevations. This macrogroup also includes montane forests along rivers and slopes, and in mesic "coves" which were historically protected from wildfires. Further east in the Central Rockies, annual precipitation tends to be lower, averaging around 75 cm. Cooper et al. (1987) report that the interior hemlock-cedar forests require at least 20 cm of precipitation during the warm season.

*Soil/substrate/hydrology:* Parent materials are non-calcareous materials, predominately sedimentary rock and argillite. Intermittent shallow A horizons overlying a dominant B horizon indicate that volcanic ash and loess deposits have significant contribution to soil development, resulting in higher fertility and moisture-holding capacity required for supporting the dominant species. These forests occur on gravelly loams and silts with good aeration and drainage and a neutral to slightly acidic pH.

DISTRIBUTION

\*Geographic Range: This forest and woodland macrogroup occurs in the interior lower montane regions of the Pacific Northwest, east of the Cascade Range south along the eastern Cascades from Lake Chelan south to Mount Hood in Oregon; from interior British Columbia south to eastern Washington, eastern Oregon, northern Idaho and western Montana east to the Continental Divide (DellaSala et al. 2011). In British Columbia, it occurs in the lee of the Coast Mountains in the northwest, and extensively in the mountain valleys of the southeast.

Nations: CA, US

States/Provinces: BC, ID, MT, OR, WA

USFS Ecoregions (2007) [optional]: 242A:CC, 331A:CC, 342H:CP, 342I:CC, M242B:CC, M242C:CC, M242D:CC, M261G:CC, M331A:PP, M332A:CC, M332B:CP, M332E:C?, M332F:C?, M332G:CC, M333A:CC, M333B:CC, M333C:CC, M333D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G211 | Central Rocky Mountain Mesic Grand Fir - Douglas-fir Forest |
| G217 | Central Rocky Mountain Interior Western Red-cedar - Western Hemlock Forest |
| G212 | East Cascades Mesic Grand Fir - Douglas-fir Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-07-23 | M018 Northern Rocky Mountain Sub-Boreal & Montane Forest Macrogroup | M018 was merged into M017; subsequently M017 split into M500 & M501 |
| 2012-07-23 | M017 Central Rocky Mountain Lower Montane & Foothill Forest Macrogroup | M017 split into M500 & M501 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | *Picea glauca* series | Hoffman and Alexander 1987 |  |
| < | Cedar-hemlock-pine forest (*Thuja-Tsuga-Pinus*) | Küchler 1964 |  |
| >< | Grand Fir: 213 | Eyre 1980 | Grand fir stands are an important component of this group. |
| < | Grand fir-Douglas fir forest (*Abies-Pseudotsuga*) | Küchler 1964 |  |
| >< | Western Hemlock: 224 | Eyre 1980 | Moist western slopes of the northern Rocky Mountains, in northern ID, northwest MT, and northeast WA. |
| < | Western Larch: 212 | Eyre 1980 |  |
| >< | Western Redcedar - Western Hemlock: 227 | Eyre 1980 | NW MT, N ID |
| >< | Western Redcedar: 228 | Eyre 1980 |  |
| >< | Western White Pine: 215 | Eyre 1980 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: A.W. Küchler (1964)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M.S. Reid, K.A. Schulz, D. Meidinger, and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 09 Jun 2015

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1. Forest & Woodland

1.B.2.Nd. Vancouverian Forest & Woodland

D192. Vancouverian Forest & Woodland

Type Concept Sentence: This division includes forests and woodlands of the lowland, montane and subalpine zones of cool maritime temperate climates of western North America characterized by the conifers *Abies amabilis, Abies grandis, Abies lowiana, Abies magnifica, Abies procera, Calocedrus decurrens, Callitropsis nootkatensis, Callitropsis lawsoniana, Picea sitchensis, Pinus contorta var. contorta, Pinus jeffreyi, Pinus lambertiana, Pinus ponderosa var. benthamiana, Pseudotsuga menziesii var. menziesii, Sequoia sempervirens, Sequoiadendron giganteum, Thuja plicata, Tsuga heterophylla*, and *Tsuga mertensiana*, the broadleaf evergreen trees *Arbutus menziesii, Notholithocarpus densiflorus*, and *Quercus chrysolepis*, and the broadleaf deciduous species *Acer macrophyllum, Alnus rubra*, and *Quercus kelloggii*.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.2.Nd. Cool Temperate Forest & Woodland (F008)

Elcode: D192

\*Scientific Name: *Pseudotsuga menziesii - Tsuga heterophylla - Tsuga mertensiana* Vancouverian Forest & Woodland Division

\*Common (Translated Scientific) Name: Douglas-fir - Western Hemlock - Mountain Hemlock Vancouverian Forest & Woodland Division

\*Colloquial Name: Vancouverian Forest & Woodland

\*Type Concept: This division includes forests and woodlands of the lowland, montane and subalpine zones of maritime temperate climates of western North America, ranging from the Gulf of Alaska to California and south in high elevations of the mountains of Baja California, Mexico. Evergreen needle-leaved trees (conifers) dominate stands overall although broad-leaved evergreens codominate in drier climate areas in the southern range. Strong diagnostic conifers include *Abies amabilis, Callitropsis nootkatensis, Picea sitchensis, Pinus contorta var. contorta, Pseudotsuga menziesii var. menziesii*, and *Tsuga mertensiana*. Moderate diagnostic conifers are *Abies grandis, Abies lowiana, Abies magnifica* (*var. magnifica, var. shastensis*), *Abies procera, Calocedrus decurrens, Chamaecyparis lawsoniana, Pinus jeffreyi, Pinus lambertiana, Pinus ponderosa var. benthamiana, Sequoia sempervirens, Sequoiadendron giganteum, Thuja plicata*, and *Tsuga heterophylla*. The broadleaf evergreen trees *Arbutus menziesii, Notholithocarpus densiflorus, Quercus chrysolepis*, and *Umbellularia californica*, and the broad-leaved deciduous trees *Acer macrophyllum, Quercus garryana*, and *Quercus kelloggii* are moderate diagnostic species. *Alnus rubra*, a broadleaf deciduous species, is a strong diagnostic. Most tree species are long-lived and stands tend to be tall, two- or multi-storied and composed of two or more species. Some stands are composed of very tall trees, 40-60 m or more in height. Understory shrub layers are often well-developed, whereas forbs are generally of low dominance, unless dominated by ferns. Bryophytes are often of high cover. Strong diagnostic understory species include *Acer circinatum, Achlys triphylla, Blechnum spicant, Elliottia pyroliflora, Gaultheria shallon, Mahonia nervosa, Oxalis oregana, Polystichum munitum, Rhododendron macrophyllum, Rubus spectabilis, Vaccinium alaskaense, Vaccinium parvifolium, Vaccinium ovatum*, and *Rhytidiadelphus loreus*.

Although influenced by a maritime climate, the major types of forests and woodlands vary in response to degree of maritime influence, temperature regimes as impacted by elevation and latitude, and precipitation regimes. Precipitation can be as low as 50 cm (20 inches) in the extreme rainshadow areas and over 400 cm (1000 inches) in the wetter mountains. Lower elevations mostly receive 90-380 cm (35-150 inches) falling predominantly as winter rain. Hypermaritime areas receive additional moisture by fog drip. Winter snowfall ranges from absent, to rare to regular, with the highest amount and duration occurring in higher elevations and northern areas. In drier areas and warm exposures, particularly in the southern range, summer drought can be significant. These forests and woodlands occur on a variety of upland soils including dry to moist upper, mid- and toeslopes, valley floors and side terraces, and stabilized coastal sand dunes. Some soils are influenced by salt spray. Bedrock geology includes volcanic, intrusive, metamorphic, sedimentary and ultramafic rocks.

The predominant natural disturbance factor varies over this type, from areas with an historical preponderance of fire to those with essentially no fire where small-patch gap dynamics prevail. Areas with little to no fire occur in wetter climatic areas, mostly in the northern range of this type. Fire becomes an increasingly important factor of stand dynamics where drier climatic conditions exist in the more southern and submaritime ranges of this type, as well as dry microclimate pockets throughout the range. Logging has altered the stand structure, species composition, and landscape pattern of forests of this type.

\*Diagnostic Characteristics: Maritime-influenced conifer and mixed broadleaf evergreen forests and woodlands of upland areas bordering the Pacific Coast and western mountain slopes from Alaska to Baja California. Strong and moderate diagnostic tree species are *Abies amabilis, Abies concolor, Abies grandis, Abies lowiana, Abies magnifica, Abies procera, Acer macrophyllum, Alnus rubra, Arbutus menziesii, Calocedrus decurrens, Callitropsis nootkatensis, Chamaecyparis lawsoniana, Picea sitchensis, Pinus contorta var. contorta, Pinus jeffreyi, Pinus lambertiana, Pinus ponderosa var. benthamiana, Pseudotsuga menziesii var. menziesii, Sequoia sempervirens, Sequoiadendron giganteum, Thuja plicata, Tsuga heterophylla*, and *Tsuga mertensiana*.

\*Classification Comments: Over much of the eastern range of this, it abuts 1.B.2.Nb ~Rocky Mountain Forest & Woodland Division (D194)$$. There is some overlap in tree species between the two divisions, such as *Abies grandis, Pinus contorta, Pinus ponderosa, Pseudotsuga menziesii, Thuja plicata*, and *Tsuga heterophylla* (different varieties for *Pinus contorta, Pinus ponderosa*, and *Pseudotsuga menziesii*) but numerous tree and understory species are helpful in distinguishing the two. Understory species such as *Gaultheria shallon, Rubus spectabilis, Mahonia nervosa, Polystichum munitum*, and *Rhytidiadelphus loreus* are found in D192, whereas *Vaccinium membranaceum, Vaccinium scoparium, Calamagrostis rubescens, Xerophyllum tenax*, and *Pleurozium schreberi* predominate in D194.

In Alaska, this division transitions to 1.B.4.Na ~North American Boreal Forest & Woodland Division (D014)$$. That division includes the "subboreal" component where *Picea x lutzii* and occasional *Tsuga mertensiana* are found, along with *Picea glauca* and *Picea mariana* [see ~Alaskan-Yukon Boreal Moist White Spruce - Hardwood Forest Group (G627)$$ in ~Alaskan-Yukon North American Boreal Forest Macrogroup (M156)$$]. The gradient may be too rapid in Alaska to have reasonable expression of a distinct subboreal component at the group or higher level.

The name *Pinus ponderosa var. benthamiana* is used in this description for the Pacific coastal subtaxon. A recent paper from the USDA Forest Service (Callaham 2013) proposes that the taxon be named *Pinus ponderosa ssp. critchfieldiana*. *Abies lowiana* is treated as a specific rank in USDA Plants and Flora of North America (FNA Editorial Committee 1993). It seems that both species occur in this division.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D007 | Californian Forest & Woodland | includes warmer climate forests, woodlands and savannas dominated by oak and conifer species that occur south of D192. |
| D194 | Rocky Mountain Forest & Woodland | includes predominately conifer forests and woodlands of temperate continental climate areas that occur to the east of the D192. To the north, in northern British Columbia, D194 forests are a narrow band between coastal forests of D192 and boreal forests of D014. |
| D193 | Vancouverian Flooded & Swamp Forest | includes floodplain and swamp forests over the range of D192. |
| D014 | North American Boreal Forest & Woodland | includes cold, continental climate forests and woodlands that abut D192 in Alaska. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The communities of this type are mostly forests, with woodlands occurring on some dry sites, and tree patches (islands) at upper elevations (near alpine tundra). Evergreen needle-leaved trees (conifers) dominate stands overall, although broad-leaved evergreens codominate in drier, southern areas. Broad-leaved deciduous trees occur in lower elevations, mostly in young stands. Most tree species are long-lived (500-1000 years and older) and stands tend to be tall, two- or multi-storied and composed of two or more species. Some stands are composed of very tall trees, 40-60 m or more in height (*Picea sitchensis* trees up to 90 m; *Sequoia sempervirens* trees up to 115 m), whereas other stands can be short, only 5-15 m tall. (e.g., high elevations near tree line). Shrub layers are often well-developed and composed of tall or short broad-leaved deciduous or evergreen shrubs. Dwarf-shrubs are common in and amongst tree patches at upper elevations. Forbs predominate in the herb layer, which is generally of low dominance, except on moist sites dominated by ferns. Bryophytes generally dominate on the forest floor. Young stands with a dense canopy often have little to no understory, except for some bryophytes.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The forests and woodlands of this type are typically dominated by conifers (needle-leaved trees) or, in dry southern climates, by a mix of needle-leaved, broad-leaved evergreen, and broad-leaved deciduous trees. Deciduous broad-leaved trees are also found in younger stands in dry climates, and on recently disturbed sites throughout.

Much of the range of this division is characterized by *Tsuga heterophylla*, which occurs in lowland and low montane forests from Alaska to northern California. In Alaska and along the coast from British Columbia to southern Oregon, it commonly occurs with *Picea sitchensis*. These two species dominate forests of this division in Alaska and can occur with *Callitropsis nootkatensis* or *Tsuga mertensiana*. From northern British Columbia to southern Oregon, these two species, often with *Thuja plicata*, typically dominate the coastal band that is influenced by fog (also called "fog belt" or "hypermaritime"). In this zone they commonly occur with an understory dominated by *Gaultheria shallon* or *Vaccinium ovatum*. *Picea sitchensis* strongly dominates along outer coast stands influenced by salt spray. Further south, in California, *Sequoia sempervirens* occurs in this fog zone, often with *Tsuga heterophylla* (northern range) or *Pseudotsuga menziesii*.

*Tsuga heterophylla* occurs with *Abies amabilis* and *Thuja plicata* in moist climate forests that are just inland of the *Tsuga heterophylla - Picea sitchensis* forests along the coast of British Columbia, and at mid elevations along the windward slopes of coastal mountain ranges in Washington and Oregon. *Callitropsis nootkatensis* can codominate, particularly at higher elevations of these forests; *Abies procera* also occurs at higher elevations in the U.S. range. Common understory dominants are *Blechnum spicant, Rhododendron macrophyllum, Rubus spectabilis, Vaccinium ovalifolium*, and *Rhytidiadelphus loreus*. Small landslides often occur in areas of high precipitation and are initially covered by *Alnus rubra*.

*Tsuga heterophylla* occurs with *Pseudotsuga menziesii* and *Thuja plicata* in lowland and low montane forests of drier climates from southern British Columbia to southern Oregon. These forests are characterized by an understory that may include *Acer circinatum, Achlys triphylla, Gaultheria shallon, Mahonia nervosa, Oxalis oregana, Polystichum munitum, Rhododendron macrophyllum*, and *Rubus spectabilis*. Drier sites associated with these forests can be dominated by *Pinus contorta*, which may be either an early species or may persist on the driest sites. Younger mesic and moist forests often contain the broad-leaved deciduous trees *Acer macrophyllum* or *Alnus viridis*. Local climatic areas that are too dry for *Tsuga heterophylla* have conifer stands codominated by *Pseudotsuga menziesii* and *Abies grandis*, with *Thuja plicata* on moister sites. Dry sites in these areas may have scattered *Arbutus menziesii* or *Quercus garryana* with *Pseudotsuga menziesii*, or even stands dominated by *Quercus garryana*. The understory of these drier *Pseudotsuga menziesii* stands is similar to those with some *Tsuga heterophylla*, but with the following species being more prevalent: *Corylus cornuta var. californica, Holodiscus discolor, Lonicera hispidula*, and *Symphoricarpos albus*.

In coastal areas of southern Oregon and northern California, additional tree species occur. The lowest elevation stands are a mix of needle-leaved evergreen, broad-leaved evergreen, and broad-leaved deciduous trees, including *Arbutus menziesii, Notholithocarpus densiflorus, Calocedrus decurrens, Pinus jeffreyi, Pinus lambertiana, Pinus ponderosa var. benthamiana, Pseudotsuga menziesii, Quercus chrysolepis, Quercus kelloggii*, and *Umbellularia californica*. *Abies concolor* and *Abies lowiana* increases in abundance at higher elevations of these forests and forms mixed stands with *Pseudotsuga menziesii* at mid elevations. In California, these mid-elevation forests can also include *Sequoiadendron giganteum*. Other possible tree species are *Abies bracteata, Chrysolepis chrysophylla, Picea breweriana*, and *Pseudotsuga macrocarpa*.

High montane forests are characterized by *Tsuga mertensiana*, with *Abies amabilis* codominating in the central range (to extreme southeastern Alaska) and *Abies magnifica* (*var. magnifica* and *var. shastensis*) dominating in the southern range (southern Oregon and south). Several other tree species also occur in these high-elevation forests: *Abies lasiocarpa* and *Callitropsis nootkatensis* are found in the central and northern range, with *Abies lasiocarpa* in areas with a continental influence; *Abies procera* and *Pinus monticola* occur in the central range; *Pinus albicaulis* and *Pinus contorta var. murrayana* occur in the central and south. *Abies lasiocarpa, Pinus albicaulis, Pinus contorta var. murrayana*, and *Tsuga mertensiana* are the most frequent species at subalpine elevations. The understory of the central and northern forests is dominated by *Vaccinium ovalifolium*, often with *Menziesia ferruginea, Elliottia pyroliflora, Rubus pedatus, Streptopus lanceolatus var. curvipes (= Streptopus roseus), Vaccinium membranaceum*, and sometimes *Rhododendron albiflorum*. The southern forests have a drier climate and species such as *Arctostaphylos nevadensis, Quercus sadleriana, Quercus vacciniifolia, Symphoricarpos oreophilus*, and *Xerophyllum tenax* occur.

In some locales, the upper canopy may be dominated by non-native tree species such as *Acer platanoides, Crataegus arborea, Ilex aquifolium, Ilex crenata, Pinus nigra, Pinus sylvestris*, and *Prunus padus*, among others. *Pinus nigra* and *Pinus sylvestris* occur on stable sand dunes in Oregon; they were planted as a soil erosion measure.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The predominant natural disturbance factor varies over this type, from areas with an historical preponderance of fire to those with essentially no fire where small-patch gap dynamics prevail. Areas with little to no fire occur in wetter climatic areas, mostly in the northern range of this type, but also some areas in the central range. These include forests dominated by *Abies amabilis* and *Tsuga heterophylla*, northern forests dominated by *Picea sitchensis* and *Tsuga heterophylla*, central and northern "fog belt" forests, and most high-montane and subalpine forests. These forests rarely burn; gaps due to death by insects or pathogens (primarily root-rots) and/or windthrow of individual trees or small patches are the predominant source of stand dynamics. Stands can be very old with individual trees 700 to over 1000 years in age. The gap dynamics in these old forests results in a multi-aged stand structure; however, unless growing in wind-protected conditions, windthrow and breakage tend to keep these forests from becoming or remaining very old. High-montane forests can also be impacted by snow avalanches that extend beyond what occurs normally within avalanche tracks.

Fire becomes an increasingly important factor of stand dynamics where drier climatic conditions exist in the more southern and submaritime ranges of this type, as well as dry microclimate pockets throughout the range. In drier stands, where fire did/does occur, the dominant natural (pre-European settlement) process included stand-replacing fires on average every 150-500 years. In these situations, where old-growth does exist, it is mostly "young old-growth" about 200-500 years in age. Natural-origin stands less than 200 years old are also common. Mixed-severity fires occur more frequently (about every 50-100 years) in the drier more submaritime and often southern parts of this division. *Pseudotsuga menziesii* is usually prevalent in areas influenced by fire.

In the driest climatic areas, stand-maintaining surface fires, both aboriginal and lightning-caused, were more frequent (perhaps every 50-100 years) and likely maintained a moderately open overstory as well as favoring fire-adapted species. For example, the thick bark of *Pseudotsuga menziesii* allows it to survive surface fires, and *Arbutus menziesii* can generate from stump sprouts following fire. Due to fire suppression, the majority of these forests now exist with closed canopies. In many cases, *Abies grandis, Tsuga heterophylla*, and other fire-sensitive, shade-tolerant species dominate forests on sites once dominated by *Pseudotsuga menziesii* and *Pinus ponderosa*, which were formerly maintained by wildfire. Fire suppression has tended to result in increasing abundance of *Arbutus menziesii, Notholithocarpus densiflorus*, and *Umbellularia californica*. *Sequoia sempervirens* stands historically had surface fires that exposed mineral soil necessary for redwood seed germination.

Small landslides are frequent in wetter climates and are initially colonized by *Alnus rubra*. These small patches are evident on the landscape.

Human disturbances have altered stand structure, species composition and landscape pattern of forests of this type. Logging is prevalent, and areas once dominated by old stands of *Pseudotsuga menziesii* or *Sequoia sempervirens* have been logged for over a century. It is estimated that 95% or more of the original old-growth *Sequoia sempervirens* trees have been cut down. Landscapes in areas of forest harvesting have a reduced proportion of old stands and an increased component of broad-leaved deciduous species such as *Acer macrophyllum* or *Alnus rubra*. These seral forests can persist (>200 years) and remain as mixed deciduous-conifer forests.

The introduction of Sitka black-tailed deer to Haida Gwaii has drastically altered the understory biomass on forests of the islands; due to lack of predators, the deer have proliferated.

ENVIRONMENT

Environmental Description: Forests and woodlands of this type occur on upland sites of cool-temperate, maritime-influenced regions of western North America. Elevations range from sea level to the alpine tundra treeline, which occurs at about 900-1350 m (3000-4500 feet) in the northern range (the higher elevations occur more inland where the snowpack is not as deep and heavy), and up to 3670 m (12,000 feet) in the south.

*Climate:* The climate is cool-temperate and maritime, ranging from hypermaritime, along the outer coast, to submaritime on the eastern slopes of the major coastal mountain ranges, i.e., Coast, Cascade and Sierra Nevada. Temperature regimes vary considerably from south to north, low to high elevation, and distance from the coast, but overall, winters are milder and summers generally cooler than forest types to the east. Mean annual precipitation and amount of snow also vary considerably along the same gradients as temperature. Precipitation can be as low as 50 cm (20 inches) in the extreme rainshadow areas and over 400 cm (1000 inches) in the wetter mountains. Lower elevations mostly receive 90-380 cm (35-150 inches) falling predominantly as winter rain. Hypermaritime areas receive additional moisture by fog drip. Winter snowfall ranges from absent, to rare to regular, with the highest amount and duration occurring in higher elevations and northern areas. High-montane areas in the northern range can have a heavy (high moisture content) snow cover for 5-9 months. In drier areas and warm exposures, particularly in the southern range, summer drought can be significant.

*Soils/substrate:* These forests and woodlands occur on a variety of upland soils, including dry to moist upper, mid- and toeslopes, valley floors and side terraces, and stabilized coastal sand dunes. Soils range from dry to subirrigated, and although generally deep and fine- to moderately coarse-textured, they can also be on ridges and rocky slopes, with shallow and coarse-textured, rocky substrates. Slopes can be gentle to extremely steep. Some soils are influenced by salt spray. Bedrock geology includes volcanic, intrusive, metamorphic, sedimentary and ultramafic rocks.

*Biogeography:* The expression of the major types of forests and woodlands of this division are in response to climatic gradients of continentality (hypermaritime to submaritime), temperature (elevation and latitude), and precipitation, as well as differences in the flora from north to south. The Vancouverian flora from Alaska to the mid-coast of British Columbia, extending south to mid Oregon in the wetter climates and higher elevations, is reasonably uniform in tree species and understory. *Tsuga heterophylla, Tsuga mertensiana, Callitropsis nootkatensis*, and *Picea sitchensis* range throughout; *Abies amabilis* and *Thuja plicata* do not occur in most of Alaska but otherwise occur, except that *Abies amabilis* is absent from the islands of Haida Gwaii.

The lower elevation, drier, rainshadow climates from southern British Columbia to mid Oregon and California also have a reasonably uniform flora, composed of species that tolerate warmer and drier conditions. *Pseudotsuga menziesii* is prevalent in this region, which also includes *Arbutus menziesii, Quercus garryana*, and *Abies grandis*, in addition to the wide-ranging *Tsuga heterophylla*.

The flora from southern Oregon into the forested regions of California is broadly uniform, comprised of wide-ranging species such as *Abies concolor, Abies lowiana, Abies magnifica, Calocedrus decurrens, Notholithocarpus densiflorus, Pinus jeffreyi, Pinus lambertiana, Pinus ponderosa var. benthamiana, Pseudotsuga menziesii, Quercus chrysolepis, Quercus kelloggii*, and *Umbellularia californica*. A few species have restricted ranges, e.g., *Abies bracteata, Chrysolepis chrysophylla, Picea breweriana, Pinus coulteri, Pseudotsuga macrocarpa, Sequoia sempervirens*, and *Sequoiadendron giganteum*.

DISTRIBUTION

\*Geographic Range: This division ranges along the coast, including coastal islands, and east into the coastal mountain ranges (Coast, Cascade, Sierra Nevada) from the Gulf of Alaska south to California. It also occurs south through the maritime lowlands of western California, and at high elevations, south through the Peninsula and Transverse ranges to Baja California, Mexico.

Nations: CA, MX, US

States/Provinces: AK, BC, CA, MXBC, NV, OR, WA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M886 | Southern Vancouverian Dry Foothill Forest & Woodland |
| M023 | Southern Vancouverian Montane-Foothill Forest |
| M024 | Vancouverian Coastal Rainforest |
| M025 | Vancouverian Subalpine-High Montane Forest |
| M405 | Vancouverian Ruderal Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-03-29 | D009 Western North American Cool Temperate Forest Division | D009 split into 2 new divisions (D192 & D194). |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Pacific Northwest Forests | Franklin and Halpern 2000 | Franklin and Halpern describe forests of Oregon northward. |
| > | Temperate and Boreal Rainforests of the Pacific Northwest | DellaSala et al. 2010 | DellaSala et al. include cedar - hemlock forests of temperate continental climates (called "boreal"). |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.F. Franklin and C.B. Halpern (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Meidinger

Acknowledgments [optional]: G. Kittel, M.S. Reid, D. Faber-Langendoen

REFERENCES

\*References [Required if used in text]:

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DellaSala, D .A., F. Moola, P. Alaback, P. C. Paquet, J. W. Schoen, and R. Noss. 2010. Temperate and boreal rainforests of the Pacific Coast of North America. Chapter 2 in: D. A. DellaSala, editor. Temperate and Boreal Rainforests of the World: Ecology and Conservation. Island Press, Washington, DC. ISBN: 9781597266758. 336 pp.

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Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Franklin, J. F., and C. B. Halpern. 2000. Pacific Northwest forests. Chapter 5 in: M. G. Barbour and W. D. Billings, editors. North American terrestrial vegetation. Cambridge University Press, New York.

Orians, G., and D J. Schoen, editors. 2013. North Pacific temperate rainforests. University of Washington Press, Seattle. ISBN: 9780295992617. 416 pp.

1. Forest & Woodland

1.B.2.Nd. Vancouverian Forest & Woodland

M886. Southern Vancouverian Dry Foothill Forest & Woodland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Nd. Vancouverian Forest & Woodland (D192)

Elcode: M886

\*Scientific Name: Southern Vancouverian Dry Foothill Forest & Woodland Macrogroup

\*Common (Translated Scientific) Name: Southern Vancouverian Dry Foothill Forest & Woodland Macrogroup

\*Colloquial Name: Southern Vancouverian Dry Foothill Forest & Woodland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CA, US

States/Provinces: BC, CA, OR, WA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G800 | Southern Vancouverian Dry Douglas-fir - Madrone Woodland |
| G206 | Cascadian Oregon White Oak - Conifer Forest & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.2.Ne. North American Great Plains Forest & Woodland

D326. North American Great Plains Forest & Woodland

Type Concept Sentence: This division contains aspen, oak and mixed hardwood woodlands dominated by *Quercus macrocarpa, Populus tremuloides*, or *Betula papyrifera*, often with an understory dominated by prairie shrubs, grasses and forbs that are more tolerant of shade. It is found throughout the northern Great Plains, from central Kansas to the Canadian aspen parkland region.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.2.Ne. Cool Temperate Forest & Woodland (F008)

Elcode: D326

\*Scientific Name: *Quercus macrocarpa - Populus tremuloides / Pascopyrum smithii* Woodland Division

\*Common (Translated Scientific) Name: Bur Oak - Quaking Aspen / Western Wheatgrass Woodland Division

\*Colloquial Name: North American Great Plains Forest & Woodland

\*Type Concept: This division is composed of aspen, oak and mixed hardwood woodlands found throughout much of the Great Plains, from central Kansas to the Canadian aspen parkland region. Deciduous trees dominate most stands. Trees are typically short to medium in height, and the canopy can vary from open to closed (10-100%). *Quercus macrocarpa* is common across much of eastern part of the range; *Populus tremuloides* and *Betula papyrifera* are most abundant northward, and scattered in the southern parts. *Fraxinus pennsylvanica* and *Ulmus americana* are abundant in ravines and draws in the central and southern parts of the range. The shrub stratum can be nearly absent but is typically moderate to dense. *Amelanchier alnifolia, Corylus* spp., *Elaeagnus commutata, Prunus americana, Prunus virginiana, Ribes* spp. (including *Ribes oxyacanthoides*), *Rosa* spp. (including *Rosa arkansana, Rosa woodsii*), *Salix* spp., *Shepherdia argentea, Symphoricarpos albus, Symphoricarpos occidentalis*, and small trees are common. The understory is typically dominated by shrubs, grasses and sedges more tolerant of shade, but may also be common in the surrounding prairies. Among these are *Andropogon gerardii, Calamagrostis canadensis, Festuca* spp., *Pascopyrum smithii, Sorghastrum nutans*, and *Sporobolus heterolepis*. Most stands occur on the landscape where water accumulates and where there is some protection from fire, i.e., in ravines, near rivers or ponds, or on mesic slopes. Northward, where the woodlands approach the boreal forests, trees are more common and this type is more widespread on the landscape. Stands occur on a variety of soils, though fine-textured soils are more common. Fire, drought, and grazing are important drivers of the system.

\*Diagnostic Characteristics: This type is distinguished from the grasslands adjacent to it across much of its range by having <10% tree cover. In the north, other forests can be adjacent but they are typically dominated by coniferous trees.

\*Classification Comments: Recognition of Great Plains Forest & Woodland as its own division, with a single macrogroup, is controversial. The Great Plains generally have a lower diversity of species than other temperate biomes in North America. In earlier drafts of the USNVC, the single macrogroup of this division was included with eastern North American forests, resulting in a division that extended from the Atlantic Coast westward to Alberta, Montana, Wyoming and Colorado. A major reason for recognizing this division is that there are only a handful of tree species that extend from either 1.B.2.Na ~Eastern North American Forest & Woodland Division (D008)$$ or 1.B.2.Nb ~Rocky Mountain Forest & Woodland Division (D194)$$, and yet these few trees species are spread across a large biogeographic and climatic region. They also contain a ground layer that may be rather distinct from the Eastern or Rocky Mountain forests and woodlands. Currently this division includes Great Plains forests and woodlands that share tree species with eastern or boreal forests, but it may be that several *Pinus ponderosa* or *Juniperus scopulorum* associations in the Great Plains could be added. We have not had an opportunity to fully review this possibility. All that said, there is another approach (C. Lea pers. comm. 2015) to this issue, namely to extend the Rocky Mountain division further east into the Plains, thereby reducing the westward fingers of the Eastern forests (though it does not address the Great Plains to boreal transition issue in the aspen parkland). That approach avoids the rather problematic issue of this division not having diagnostic species, though it doesn't address the added ecological and biogeographic variability of extending those divisions. It may also be that the Eastern forest division itself, even without the Great Plains component, is too heterogeneous, and realignment of that division might change the perspective here. A fuller review of these proposals are needed.

Where the northwestern Great Plains transition to mountains, this type may appear similar to early-successional stands of Rocky Mountain types at the lowest montane elevations where those occur.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D008 | Eastern North American Forest & Woodland | D328 could conceivably be merged with this division, as all of the species are found there, but the turnover is so high, and the understories rather different, that for now it is treated separately. |
| D011 | Eastern North American-Great Plains Flooded & Swamp Forest | Mesic terraces of D328 may resemble floodplain types. |
| D023 | Central North American Grassland & Shrubland | When oak and aspen woodlands in D326 are fire-maintained, they may resemble stands of D023, but D023 has tree cover <10%. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This division is dominated by deciduous trees, though the tree cover can vary from 10-100%. Trees are short to medium-tall (5-10 m tall). The shrub layer is usually moderate to dense with most shrubs 0.5-2 m tall. The herbaceous layer is also typically moderate to dense and dominated by a mix of graminoids, forbs and shrubs.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Quercus macrocarpa* is dominant in the eastern part of the range; *Populus tremuloides* and *Betula papyrifera* are abundant northward, especially in the aspen parkland regions, and more scattered in the southern parts. *Fraxinus pennsylvanica* and *Ulmus americana* are abundant in ravines and draws. Trees that can be locally common or abundant include *Juniperus scopulorum* in the western Great Plains, *Populus balsamifera* in the far northern Great Plains, and *Tilia americana* and *Juniperus virginiana* in the eastern Great Plains. The shrub stratum can be nearly absent but is typically moderate to dense. *Amelanchier alnifolia, Corylus* spp., *Elaeagnus commutata, Prunus americana, Prunus virginiana, Rosa* spp. (including *Rosa acicularis, Rosa arkansana, Rosa blanda, Rosa woodsii*), *Salix* spp., *Shepherdia argentea, Symphoricarpos albus, Symphoricarpos occidentalis*, and small trees are common. *Crataegus* spp., *Juniperus horizontalis*, and *Cornus sericea* can be locally common. The understory is typically dominated by low shrubs, grasses, sedges or forbs, some of which may be common in the surrounding prairies, particularly if woodlands are allowed to burn under natural fire regimes. Common grasses found in more open, fire-maintained stands include *Andropogon gerardii, Calamagrostis canadensis, Festuca* spp. (including *Festuca altaica*), *Pascopyrum smithii, Sorghastrum nutans*, and *Sporobolus heterolepis*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: This type occurs in a landscape where fire was historically common, in combination with periodic droughts. Fire restricts this type within much of its range, limiting the trees to protected places on the landscape. Fire was used by aboriginal peoples for maintaining open grassland. A reduction in fire frequency typically allows this woodland type to spread into surrounding prairies, though it also allows the tree canopy of established stands to close with a reduction in the prairie flora in the understory. In the northeastern Great Plains, conditions are more favorable for tree growth and fire is necessary to maintain this type. A significant reduction in fire frequency allows the woodlands to succeed to forests and the prairie plants are replaced by a forest understory.

Periodic drought and grazing also help maintain the open canopy of this type with intense grazing by bison, elk, and other grazers to limit woody regeneration. The combination of natural fire regimes and grazing pressures, especially in the northern part of the range, contributed to a dynamic natural landscape tension between parkland and prairie, with trees advancing in times of greater moisture and/or less grazing. Native wildlife (e.g., buffalo wallows) also created areas of exposed mineral soil that acted as seed beds for aspen, willow, etc. seedling establishment (Bird 1961).

ENVIRONMENT

Environmental Description: Across much of its range, stands occur on landscape positions that receive more water than the surrounding landscape, i.e., in ravines or canyons, near rivers and lakes, and on mesic, typically north-facing slopes. In the aspen parklands of the southern Canadian provinces, Montana, North Dakota and northwestern Minnesota, this type is common on flat or rolling topography. In these areas, the evapotranspiration rate and precipitation are more favorable to tree growth and trees are not as restricted to protected landscape positions. See Zoltai (1975) and Hogg (1994) regarding climatic balance between parkland and boreal forest in Canada. Stands can occur on a variety of soil textures but fine-textured soils are more common. The aspen woodlands in the parkland region are more mesic than stands found in the rest of the Great Plains and wet-mesic or even wet pockets are common.

DISTRIBUTION

\*Geographic Range: This type is found throughout the central and northern Great Plains from Kansas and Colorado north to southeastern Alberta, southern Saskatchewan, southwestern Manitoba, northern North Dakota and northwestern Minnesota. It may occur in Oklahoma.

Nations: CA, US

States/Provinces: AB, CO, IA, KS, MB, MN, MT, ND, NE, OK?, SD, SK, WY

USFS Ecoregions (2007) [optional]: 222N:CC, 251A:CP, 251B:CC, 251H:C?, 331B:CC, 331C:CC, 331D:CC, 331E:CC, 331F:CC, 331G:CC, 331H:C?, 331K:CC, 331L:CC, 331M:CP, 331N:CC, 332A:CC, 332B:CC, 332C:CC, 332D:CC, 332E:CC, 342F:CC, M331B:??, M331I:??, M334A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M151 | Great Plains Forest & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Faber-Langendoen and J. Drake

Acknowledgments [optional]:

Version Date: 13 Jan 2016

REFERENCES

\*References [Required if used in text]:

Barbour, M. G., and W. D. Billings, editors. 1988. North American terrestrial vegetation. Cambridge University Press, New York. 434 pp.

Bird, R. D. 1961. Ecology of the aspen parkland of western Canada in relation to land use. Canada Department of Agriculture Publication 1066, Ottawa, ON. 155 pp.

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

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Tolstead, W. L. 1947. Woodlands in northwestern Nebraska. Ecology 28(2):180-188.

Zoltai, S. C. 1975. Southern limit of coniferous trees on the Canadian prairies. Information Report NOR-X-128. Environment Canada, Canadian Forestry Service, Northern Forest Research Centre, Edmonton, Alberta.

1. Forest & Woodland

1.B.2.Ne. North American Great Plains Forest & Woodland

M151. Great Plains Forest & Woodland

Type Concept Sentence: This macrogroup contains aspen, oak, and mixed hardwood woodlands dominated by *Quercus macrocarpa, Populus tremuloides*, or *Betula papyrifera*, often with an understory dominated by prairie shrubs, grasses and forbs that are more tolerant of shade. It is found throughout northern Great Plains, from central Kansas to the Canadian aspen parkland region.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.2.Ne. North American Great Plains Forest & Woodland (D326)

Elcode: M151

\*Scientific Name: *Quercus macrocarpa - Populus tremuloides / Pascopyrum smithii* Forest & Woodland Macrogroup

\*Common (Translated Scientific) Name: Bur Oak - Quaking Aspen / Western Wheatgrass Forest Woodland Macrogroup

\*Colloquial Name: Great Plains Forest & Woodland

\*Type Concept: This macrogroup consists of aspen, oak and mixed hardwood woodlands found throughout much of the Great Plains, from central Kansas to the Canadian aspen parkland region. Deciduous trees dominate most stands. Trees are typically short to medium in height, and the canopy can vary from open to closed (10-100%). *Quercus macrocarpa* is common across much of eastern part of the range; *Populus tremuloides* and *Betula papyrifera* are most abundant northward, and scattered in the southern parts. *Fraxinus pennsylvanica* and *Ulmus americana* are abundant in ravines and draws in the central and southern parts of the range. The shrub stratum can be nearly absent but is typically moderate to dense. *Amelanchier alnifolia, Corylus* spp., *Elaeagnus commutata, Prunus americana, Prunus virginiana, Ribes* spp. (including *Ribes oxyacanthoides*), *Rosa* spp. (including *Rosa arkansana, Rosa woodsii*), *Salix* spp., *Shepherdia argentea, Symphoricarpos albus, Symphoricarpos occidentalis*, and small trees are common. The understory is typically dominated by shrubs, grasses and sedges more tolerant of shade, but may also be common in the surrounding prairies. Among these are *Andropogon gerardii, Calamagrostis canadensis, Festuca* spp., *Pascopyrum smithii, Sorghastrum nutans*, and *Sporobolus heterolepis*. Most stands occur on the landscape where water accumulates and where there is some protection from fire, i.e., in ravines, near rivers or ponds, or on mesic slopes. Northward, where the woodlands approach the boreal forests, trees are more common and this type is more widespread on the landscape. Stands occur on a variety of soils, though fine-textured soils are more common. Fire, drought, and grazing are important drivers of the system.

\*Diagnostic Characteristics: This macrogroup is distinguished from the grasslands adjacent to it across much of its range by having >10% tree cover. Trees are almost entirely broadleaf deciduous, dominated by *Quercus macrocarpa, Populus tremuloides*, and *Betula papyrifera*, rarely any other species. Absence of almost any other tree species is a diagnostic feature of this division. Ground layer varies from grass-dominated (mixed or tallgrass species) in more open and fire-maintained sites to shrub- and forb-dominated in more closely canopy sites.

\*Classification Comments: Where the northwestern Great Plains transition to mountains, this macrogroup may appear similar to early-successional stands of Rocky Mountain macrogroups at the lowest montane elevations where those occur. See classification comments at the division level (1.B.2.Ne ~North American Great Plains Forest & Woodland Division (D326)$$), many of which apply to this macrogroup. It's possible that Great Plains *Pinus ponderosa* types could be added to this macrogroup.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M028 | Great Plains Flooded & Swamp Forest | can have a similar canopy composition to G145, especially. M028 is found on floodplains of perennial rivers and streams, while M151 is in dry ravines or hillsides. |
| M029 | Central Hardwood Floodplain Forest | can have a similar composition to G145, especially. M029 is found on floodplains of perennial rivers and streams while M151 is in dry ravines or hillsides. |
| M051 | Great Plains Mixedgrass & Fescue Prairie | can have a similar herbaceous and shrub composition but has <25% tree cover. |
| M054 | Central Lowlands Tallgrass Prairie | can have a similar herbaceous and shrub composition but has <25% tree cover. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is dominated by deciduous trees, though the tree cover can vary from 10-100%. Trees are short to medium-tall (5-10 m tall). The shrub layer is usually moderate to dense with most shrubs 0.5-2 m tall. The herbaceous layer is also typically moderate to dense and dominated by a mix of graminoids, forbs and shrubs.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Quercus macrocarpa* is dominant in the eastern part of the range; *Populus tremuloides* and *Betula papyrifera* are abundant northward, especially in the aspen parkland regions, and more scattered in the southern parts. *Fraxinus pennsylvanica* and *Ulmus americana* are abundant in ravines and draws. Trees that can be locally common or abundant include *Juniperus scopulorum* in the western Great Plains, *Populus balsamifera* in the far northern Great Plains, and *Tilia americana* and *Juniperus virginiana* in the eastern Great Plains. The shrub stratum can be nearly absent but is typically moderate to dense. *Amelanchier alnifolia, Corylus* spp., *Elaeagnus commutata, Prunus americana, Prunus virginiana, Rosa* spp. (including *Rosa acicularis, Rosa arkansana, Rosa blanda, Rosa woodsii*), *Salix* spp., *Shepherdia argentea, Symphoricarpos albus, Symphoricarpos occidentalis*, and small trees are common. *Crataegus* spp., *Juniperus horizontalis*, and *Cornus sericea* can be locally common. The understory is typically dominated by low shrubs, grasses, sedges or forbs, some of which may be common in the surrounding prairies, particularly if woodlands are allowed to burn under natural fire regimes. Common grasses found in more open, fire-maintained stands include *Andropogon gerardii, Calamagrostis canadensis, Festuca* spp. (including *Festuca altaica*), *Pascopyrum smithii, Sorghastrum nutans*, and *Sporobolus heterolepis*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: This type occurs in a landscape where fire was historically common, in combination with periodic droughts. Fire restricts this type within much of its range, limiting the trees to protected places on the landscape. Fire was used by aboriginal peoples for maintaining open grassland. A reduction in fire frequency typically allows this woodland type to spread into surrounding prairies, though it also allows the tree canopy of established stands to close with a reduction in the prairie flora in the understory. In the northeastern Great Plains, conditions are more favorable for tree growth and fire is necessary to maintain this type. A significant reduction in fire frequency allows the woodlands to succeed to forests and the prairie plants are replaced by a forest understory.

Periodic drought and grazing also help maintain the open canopy of this type with intense grazing by bison, elk, and other grazers to limit woody regeneration. The combination of natural fire regimes and grazing pressures, especially in the northern part of the range, contributed to a dynamic natural landscape tension between parkland and prairie, with trees advancing in times of greater moisture and/or less grazing. Native wildlife (e.g., buffalo wallows) also created areas of exposed mineral soil that acted as seed beds for aspen, willow, etc. seedling establishment (Bird 1961).

ENVIRONMENT

Environmental Description: Across much of its range, stands occur on landscape positions that receive more water than the surrounding landscape, i.e., in ravines or canyons, near rivers and lakes, and on mesic, typically north-facing slopes. In the aspen parklands of the southern Canadian provinces, Montana, North Dakota and northwestern Minnesota, this type is common on flat or rolling topography. In these areas, the evapotranspiration rate and precipitation are more favorable to tree growth and trees are not as restricted to protected landscape positions. See Zoltai (1975) and Hogg (1994) regarding climatic balance between parkland and boreal forest in Canada. Stands can occur on a variety of soil textures but fine-textured soils are more common. The aspen woodlands in the parkland region are more mesic than stands found in the rest of the Great Plains and wet-mesic or even wet pockets are common.

DISTRIBUTION

\*Geographic Range: This type is found throughout the central and northern Great Plains from Kansas and Colorado north to southeastern Alberta, southern Saskatchewan, southwestern Manitoba, northern North Dakota and northwestern Minnesota. It may occur in Oklahoma.

Nations: CA, US

States/Provinces: AB, CO, IA, KS, MB, MN, MT, ND, NE, OK?, SD, SK, WY

USFS Ecoregions (2007) [optional]: 222N:CC, 251A:CP, 251B:CC, 251H:C?, 331B:CC, 331C:CC, 331D:CC, 331E:CC, 331F:CC, 331G:CC, 331H:C?, 331K:CC, 331L:CC, 331M:CP, 331N:CC, 332A:CC, 332B:CC, 332C:CC, 332D:CC, 332E:CC, 342F:CC, M331B:??, M331I:??, M334A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G329 | Great Plains Bur Oak Forest & Woodland |
| G145 | Great Plains Mesic Forest & Woodland |
| G146 | Northeastern Great Plains Aspen Woodland |
| G328 | Northwestern Great Plains Aspen Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: J. Drake, D. Faber-Langendoen and K. Baldwin

Acknowledgments [optional]: Jeff Thorpe, Ken Baldwin, and Lorna Allen

Version Date: 08 Jan 2016

REFERENCES

\*References [Required if used in text]:

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Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Girard, M. M., H. Goetz, and A. J. Bjugstad. 1989. Native woodland habitat types of southwestern North Dakota. Research Paper RM-281. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 36 pp.

Hogg, E. H. 1994. Climate and the southern limit of the western Canadian boreal forest. Canadian Journal of Forest Research 24:1835-1845.

Minnesota DNR [Minnesota Department of Natural Resources]. 2003. Field guide to the native plant communities of Minnesota: The Laurentian Mixed Forest Province. Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. Minnesota Department of Natural Resources, St. Paul.

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Stone, C., M. G. Willoughby, and A. Rosendal. 2007. Guide to range plant community types and carrying capacity for the Peace River Parkland subregion in Alberta: First approximation. Publication No. T/143. Sustainable Resource Development, Agriculture and Agri-Food Canada, Edmonton. 143 pp. ISBN: 978-0-7785-6500 [online edition].

Tolstead, W. L. 1947. Woodlands in northwestern Nebraska. Ecology 28(2):180-188.

Zoltai, S. C. 1975. Southern limit of coniferous trees on the Canadian prairies. Information Report NOR-X-128. Environment Canada, Canadian Forestry Service, Northern Forest Research Centre, Edmonton, Alberta.

1.B.3. Temperate Flooded & Swamp Forest

Temperate Flooded & Swamp Forest is a tree-dominated wetland influenced by minerotrophic groundwater, either on mineral or organic (peat) soil, found in mid-latitudes of the globe.

1. Forest & Woodland

1.B.3.Eh. Pampean Temperate Flooded & Swamp Forest

D243. Pampean Temperate Flooded & Swamp Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.3.Eh. Temperate Flooded & Swamp Forest (F026)

Elcode: D243

\*Scientific Name: Pampean Temperate Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Pampean Temperate Flooded & Swamp Forest Division

\*Colloquial Name: Pampean Temperate Flooded & Swamp Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M661 | Espinal Floodplain Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.3.Eh. Pampean Temperate Flooded & Swamp Forest

M661. Espinal Floodplain Forest

Type Concept Sentence: Riparian and edapho-hygrophilous forests of the Parana and Uruguay river basins. Vegetation types vary due to past and current river dynamics, which influence the height of the riverbanks, the type of sediments and drainage qualities of the soils. In dense and stratified forests of stable riverbanks that flood annually for a short period of time, the characteristic tree species are *Acacia bonariensis, Allophylus edulis, Blepharocalyx salicifolius, Holocalyx balansae, Myrcia selloi, Nectandra megapotamica*, and *Terminalia australis*. Lower-statured stands dominated by *Albizia inundata* and *Sapium haematospermum* grow in more recent and dynamic settings.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Eh. Pampean Temperate Flooded & Swamp Forest (D243)

Elcode: M661

\*Scientific Name: Espinal Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Espinal Floodplain Forest Macrogroup

\*Colloquial Name: Espinal Floodplain Forest

\*Type Concept: This macrogroup represents the riparian and edapho-hygrophilous forests that develop along the tributaries and main stem of the Parana and Uruguay river basins, in their mid to lower sections and down to the Parana river delta, which opens to the Rio de la Plata, in Argentina and Uruguay. The different vegetation types within the macrogroup vary depending on their location on the geomorphologies that result from past and current river dynamics, which influence the height, the age of the sediments on the riverbanks and drainage qualities of the soils. The vegetation seral stages and composition due to the hydrologic regimes closer to the river mouth include tidal movements, and the more-or-less saturated terrains left as a result of the meandering of the river. Based on these different settings the composition and structure of these forests range from tall, dense and stratified forests growing on old stable riverbanks with mature sediments, to almost monodominant stands of lower stature in more recent and dynamic settings. For the mature forests, periodically inundated for a short period of time, the characteristic tree species are *Acacia bonariensis, Allophylus edulis, Blepharocalyx salicifolius (= Blepharocalyx tweediei), Chrysophyllum marginatum, Cupania vernalis, Eugenia uniflora, Fagara hyemalis, Holocalyx balansae, Inga vera ssp. affinis, Lithraea molleoides, Luehea divaricata, Myrcia selloi, Myrcianthes cisplatensis, Myrcianthes pungens, Myrsine parvula, Nectandra megapotamica, Ocotea diospyrifolia, Sapium haematospermum, Scutia buxifolia, Sebastiana brasiliensis, Syagrus romanzoffiana, Tabernaemontana catharinensis, Erythrina crista-galli, Myrceugenia glaucescens, Myrsine laetevirens, Nectandra angustifolia (= Nectandra falcifolia), Ocotea acutifolia*, and *Terminalia australis*. In the case of floristically poor riverine forests, the dominants are *Albizia inundata* and *Sapium haematospermum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.3.Ei. Chilean Mediterranean Flooded & Swamp Forest

D244. Chilean Mediterranean Flooded & Swamp Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.3.Ei. Temperate Flooded & Swamp Forest (F026)

Elcode: D244

\*Scientific Name: Chilean Mediterranean Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Chilean Mediterranean Flooded & Swamp Forest Division

\*Colloquial Name: Chilean Mediterranean Flooded & Swamp Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M662 | Chilean Mediterranean & Desert Riparian & Flooded Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
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\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.3.Ei. Chilean Mediterranean Flooded & Swamp Forest

M662. Chilean Mediterranean & Desert Riparian & Flooded Forest

Type Concept Sentence: Riparian forests with a range of moisture availability in the Central Chile region. Includes mid-statured, dense forests growing on alluvial soils of the valley bottoms of large rivers, with a floristic composition characterized by *Cryptocarya alba, Drymis winteri, Luma chequen, Myrceugenia exsucca*, and *Persea meyeniana*. Also included are open woodlands restricted to a narrow strip along streams that occur in drier climates and also under somewhat halophytic conditions across the central coastal plain of Chile. These are dominated by evergreen sclerophyllous trees or shrubs with ferns or halophilous grasses in the understory; diagnostic species for this type are *Distichlis* sp., *Maytenus boaria, Pleocarpus revolutus, Psoralea glandulosa, Salix humboldtiana*, and *Tessaria absinthioides*

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Ei. Chilean Mediterranean Flooded & Swamp Forest (D244)

Elcode: M662

\*Scientific Name: Chilean Mediterranean & Desert Riparian & Flooded Forest Macrogroup

\*Common (Translated Scientific) Name: Chilean Mediterranean & Desert Riparian & Flooded Forest Macrogroup

\*Colloquial Name: Chilean Mediterranean & Desert Riparian & Flooded Forest

\*Type Concept: The macrogroup includes riparian forests with a range of moisture availability in the central Chile region. These include well-developed, mid-stature dense forests on alluvial soils of the valley bottoms of large rivers which every year get temporarily inundated, with a floristic composition characterized by *Cryptocarya alba, Persea meyeniana, Drymis winteri, Luma chequen*, and *Myrceugenia exsucca*. Also included are open woodlands and shrublands restricted to a narrow strip along stream courses; the latter occur in drier climatic conditions and also under somewhat halophytic conditions in ravines across the central coastal plain. These are dominated by evergreen sclerophyllous trees or shrubs with a herbaceous stratum of ferns or halophilous grasses; diagnostic species for this type are *Salix humboldtiana, Psoralea glandulosa, Maytenus boaria, Tessaria absinthioides, Pleocarpus revolutus*, and *Distichlis* sp. Farther north, closer to the desert of northern Chile, the inland riparian communities grow under xeric conditions and high interannual variations in precipitation which generates salt deposits during the long dry periods. Species diagnostic of these communities are *Atriplex repanda, Prosopis chilensis, Prosopis flexuosa, Acacia caven*, and *Schinus polygamus*. Also in the transition from central Chile to the Atacama desert, another riparian type is included which occurs in the canyon bottoms of the Andean foothills. It is represented by a dense lauroid forest 10-12 m high, characterized by *Baccharis scandens, Cortaderia jubata, Equisetum giganteum, Escallonia angustifolia*, and *Myrica pavonis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.3.Ej. Valdivian Temperate Flooded & Swamp Forest

D245. Valdivian Temperate Flooded & Swamp Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.3.Ej. Temperate Flooded & Swamp Forest (F026)

Elcode: D245

\*Scientific Name: Valdivian Temperate Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Valdivian Temperate Flooded & Swamp Forest Division

\*Colloquial Name: Valdivian Temperate Flooded & Swamp Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M663 | Valdivian Temperate Flooded & Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.3.Ej. Valdivian Temperate Flooded & Swamp Forest

M663. Valdivian Temperate Flooded & Swamp Forest

Type Concept Sentence: Temperate swamps of hyper-humid areas in the austral region of Chile and Argentina. The open to semi-open canopy is 4-6 m high and usually dominated by *Lepidothamnus fonckii, Pilgerodenron uviferum*, and *Tepualia stipularis*. There is an herbaceous stratum dominated by cushions of *Sphagnum magellanicum, Myrteola magellanica*, and *Gaimardia australis*. This type of vegetation develops on permanently waterlogged peat soils. It also includes woodlands on hydromorphic soils of topographic depressions and valley bottoms in higher elevations in the austral Andes. These latter communities are characterized by *Nothofagus antarctica, Berberis microphylla*, and *Chusquea culeou*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Ej. Valdivian Temperate Flooded & Swamp Forest (D245)

Elcode: M663

\*Scientific Name: Valdivian Temperate Flooded & Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Valdivian Temperate Flooded & Swamp Forest Macrogroup

\*Colloquial Name: Valdivian Temperate Flooded & Swamp Forest

\*Type Concept: The macrogroup represents the woodland bogs and temperate swamps of hyper-humid areas in the austral Andes of Chile and Argentina. The open to semi-open canopy is 4-6 m high, usually dominated by *Pilgerodenron uviferum, Lepidothamnus fonckii*, and *Tepualia stipularis*, accompanied by other hygrophilous shrub or tree species, and an herbaceous stratum dominated by cushions of *Gaimardia australis*. This type of vegetation develops on permanently waterlogged peat soils subject to high precipitation (about 5000 mm per year), making it mostly ombrotrophic peatlands, but they can also receive additional input from streams and slope seepage. Diagnostic species are *Pilgerodendron uviferum, Tepualia stipularis, Nothofagus antarctica, Gaimardia australis, Scirpus inundatus, Carex frigida, Sphagnum magellanicum*, and *Myrteola magellanica*. This macrogroup includes also the woodlands on hydromorphic soils of topographic depressions and valley bottoms in higher elevations in the austral Andes. These communities are dominated by *Nothofagus antarctica* in the upper stratum and have a dense herbaceous layer beneath the open canopy. Other diagnostic species are *Berberis microphylla, Berberis darwinii, Mutisia spinosa, Chusquea culeou, Gunnera magellanica*, and *Eleocharis melanostachys*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
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RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.3.Ek. Northern Patagonian Flooded Forest

D246. Northern Patagonian Flooded Forest

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.3.Ek. Temperate Flooded & Swamp Forest (F026)

Elcode: D246

\*Scientific Name: Northern Patagonian Flooded Forest Division

\*Common (Translated Scientific) Name: Northern Patagonian Flooded Forest Division

\*Colloquial Name: Northern Patagonian Flooded Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M664 | Monte Floodplain Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.3.Ek. Northern Patagonian Flooded Forest

M664. Monte Floodplain Forest

Type Concept Sentence: Gallery forests along rivers throughout the biogeographic province known as Monte in Argentina, where there are xeric climates and significant salinity in the soils and groundwater in some places. A more diverse type of gallery forest is distributed in the southern portions of the Monte, on alluvial soils of sandy clayish texture. Mature forests can reach 20 m in height and have almost no understory. Under more xeric conditions, the formation consists of scattered trees. Diagnostic species are *Atriplex lampa, Baccharis salicifolia, Buddleja globosa, Cortaderia rudiuscula, Discaria trinervis, Glycirrhiza astragalina, Juncus acutus, Salix humboldtiana*, and *Tessaria absinthioides*. In the Rio Atuel Basin, with more xeric conditions and saline soils, a riparian woodland with almost monodominant stands of *Tamarix gallica* forms.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Ek. Northern Patagonian Flooded Forest (D246)

Elcode: M664

\*Scientific Name: Monte Floodplain Forest Macrogroup

\*Common (Translated Scientific) Name: Monte Floodplain Forest Macrogroup

\*Colloquial Name: Monte Floodplain Forest

\*Type Concept: These are gallery forests along rivers throughout the biogeographic province known as Monte in Argentina, where the climate is xeric and soils and groundwater have significant salinity contents in some places. The more diverse type of gallery forest tends to be distributed in the southern portions of the Monte in the Neuquen and Rio Negro provinces, on alluvial soils of sandy clayish texture. Mature forests can reach 20 m, but have a very poorly developed understory. Under more xeric conditions, the formation is not a forest but scattered trees. Diagnostic species are *Salix humboldtiana, Baccharis salicifolia, Tessaria absinthioides, Discaria trinervis, Discaria serratifolia, Phragmites australis (= Phragmites communis), Juncus acutus, Buddleja globosa, Glycirrhiza astragalina, Cortaderia rudiuscula*, and *Atriplex lampa*. Towards the north in the same region, with stronger xeric conditions and saline soils, in the Rio Atuel basin, develops another type of riparian forest or woodland which is formed by almost monodominant stands of *Tamarix gallica*. The younger stands are 0.5-2.5 m high, while the ones on older riverbanks can reach 3-5 m high. Also in the transition to the northern Atacama Desert, another type of riparian forest develops at the canyon bottoms of the Andes foothills. This open forest, 10-12 m high, is characterized by *Baccharis scandens, Cortaderia jubata, Equisetum giganteum, Escallonia angustifolia*, and *Myrica pavonis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M665 Monte Halophyllous Forest Macrogroup | M665 concept covered by M664 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

1. Forest & Woodland

1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest

D011. Eastern North American-Great Plains Flooded & Swamp Forest

Type Concept Sentence: This division includes swamp and floodplain forests and woodlands found in poorly-drained basins or along lakeshores and deciduous wet forests along small- to large-sized rivers (on a wide range of soil types), ranging across much of cool-temperate eastern North America.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.3.Na. Temperate Flooded & Swamp Forest (F026)

Elcode: D011

\*Scientific Name: *Populus deltoides - Fraxinus pennsylvanica - Acer saccharinum* Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Eastern Cottonwood - Green Ash - Silver Maple Flooded & Swamp Forest Division

\*Colloquial Name: Eastern North American-Great Plains Flooded & Swamp Forest

\*Type Concept: This division comprises floodplain and swamp woodlands and forests ranging from the western Great Plains east to the Atlantic Coast, north into southern Canada and south to the south-central United States, north of the Gulf Coastal Plain, except along the Mississippi River. Ruderal flooded and swamp forests are also considered part of this division. Floodplain examples are located along small to large rivers or small streams with alluvial soils. They occur on sandy to sandy loam soils along sandbars, riverfronts, and levees of rivers and small streams. Swamp forest examples occur in depressions, along lakeshores or small streams. Soils are typically acidic and nutrient-poor, although some examples can range from circumneutral to alkaline with richer nutrient levels. These depression wetlands tend to be poorly- to very poorly-drained and saturated most of the growing season. Some examples can have a hummock-and-hollow microtopography. Tree species common in examples of this division vary based on geography and type of wetland (floodplain versus depression or flatwood). Typical floodplain species include *Celtis occidentalis, Fraxinus pennsylvanica, Populus deltoides*, and *Salix* spp. in the central and western range of this division. *Acer saccharinum, Celtis laevigata, Fraxinus pennsylvanica, Liquidambar styraciflua, Platanus occidentalis*, and *Ulmus americana* become more dominant from the central to the eastern range of this division. *Acer rubrum* is the most common species associated with swamp forests within this division. Other common tree species include *Nyssa sylvatica, Liriodendron tulipifera*, and *Liquidambar styraciflua*. *Larix laricina* and *Tsuga canadensis* are the most widespread and more northern conifers associated with this division. *Picea rubens, Picea mariana, Pinus strobus*, and *Abies balsamea* can be common northern associates as well. Common shrubs across the division include *Cornus* spp. and *Salix* spp. Understory species vary widely across the division. Flooding influences the majority of forests and woodlands within this division. Microtopography and fluctuating moisture levels can influence communities and species occurring within this division. Fire also can be important in some examples. Many areas within the division also have a history of some kind of human disturbance such as logging or a change in the hydrologic regime. These may lead to ruderal conditions, where dominant trees are either early-successional native species adapted to wet conditions, especially *Acer negundo* (exotic in some parts of the range), *Acer rubrum, Acer saccharinum, Fraxinus pennsylvanica*, and *Salix* spp., or, less commonly, exotic trees such as *Salix alba* or *Salix fragilis*. Disturbed sites can be heavily invaded in the understory by exotic or invasive shrub and herb species.

\*Diagnostic Characteristics: This division is characterized by flooded and swamp forests ranging from the western Great Plains eastward to the Atlantic Coast. Diagnostic tree species include *Celtis occidentalis, Fraxinus pennsylvanica, Populus deltoides*, and *Salix* spp. in the central and western range of this division. *Acer saccharinum, Celtis laevigata, Fraxinus pennsylvanica, Liquidambar styraciflua, Platanus occidentalis*, and *Ulmus americana* become more dominant from the central to the eastern range of this division. *Acer rubrum* is the most common species associated with swamp forests within this division. Other common tree species include the hardwoods *Nyssa sylvatica, Liriodendron tulipifera*, and *Liquidambar styraciflua* in the central hardwoods region and the conifers *Larix laricina* and *Tsuga canadensis* in the northern region, along with localized occurrences of *Picea rubens* and *Picea mariana*.

\*Classification Comments: This division occurs in azonal conditions across a wide geographic area and can overlap with similar divisions to the north, south, and west of its range.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D326 | North American Great Plains Forest & Woodland |  |
| D062 | Southeastern North American Flooded & Swamp Forest | borders to the south and may overlap this division along its southern border. |
| D016 | North American Boreal Flooded & Swamp Forest | occurs within similar biophysical locations, and there may be some overlap with this division along its northern border. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Stands of this division are composed of broad-leaved deciduous trees in the Great Plains and central region, and deciduous, mixed, or coniferous trees in the northern region. Canopies range from dense to partially open; shrub layers may be well-developed or sparse. In northern stands, hummock-and-hollow microtopography is characteristic, and mosses, especially species of *Sphagnum*, are common and usually abundant. Floodplain stands in the Great Plains can be particularly open, due to a combination of drought and fire.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: In central floodplain forests, the most common trees are *Acer negundo, Acer saccharinum, Celtis occidentalis, Fraxinus pennsylvanica, Platanus occidentalis, Populus deltoides*, and/or *Ulmus americana*. *Celtis laevigata* and/or *Liquidambar styraciflua* are important constituents in the southern and midwestern portions of the range. Associated tree species include *Acer rubrum, Betula nigra, Carya cordiformis, Carya illinoinensis*, and/or *Ulmus rubra*. In portions of the floodplain that are flooded for shorter durations, associates include *Acer saccharum, Carya ovata, Fraxinus americana, Juglans nigra, Liriodendron tulipifera, Prunus serotina, Quercus alba, Quercus macrocarpa*, and *Quercus rubra*. *Parthenocissus quinquefolia, Toxicodendron radicans*, and *Vitis* spp. are common vines. Central swamp forests, ranging from wet to xero-hydric flatwoods, include an equally diverse, but distinctive set of tree species, including *Acer rubrum var. trilobum, Acer saccharinum, Betula nigra, Fagus grandifolia, Fraxinus pennsylvanica, Liriodendron tulipifera, Liquidambar styraciflua, Nyssa biflora, Nyssa sylvatica, Platanus occidentalis, Quercus alba, Quercus bicolor, Quercus lyrata, Quercus michauxii, Quercus palustris, Quercus phellos*, and *Quercus stellata*.

In the Great Plains, *Populus deltoides* is the most common tree of the floodplains, and depressional swamps are rather rare. Other dominants include *Acer negundo, Fraxinus pennsylvanica, Salix nigra, Salix amygdaloides*, and, in the southeastern portion of this division's range, *Celtis laevigata* and *Platanus occidentalis*.

To the north, *Acer rubrum* is a relatively constant species throughout the range of these swamps. At the northern end of the range, canopy trees *Betula alleghaniensis, Larix laricina, Picea rubens, Pinus strobus*, and *Tsuga canadensis* are characteristic. Occasionally, colder and saturated conditions favor *Abies balsamea, Picea glauca*, or *Picea mariana*.

Disturbed stands may contain a wide variety of ruderal native and non-native species. Species composition varies with time since and nature of disturbance, available seed sources, and habitat characteristics, but common generalist native dominants in the tree strata are *Acer negundo* (exotic in parts of the range), *Acer rubrum, Acer saccharinum, Fraxinus pennsylvanica, Platanus occidentalis*, and *Salix nigra*. In a few sites, exotic trees such as *Crataegus* spp., *Salix alba*, or *Salix fragilis* may be dominant. The understory tree *Morus alba* can occur on floodplains. Ruderal stands are more often characterized by exotic and native invasive species that together cover at least 80% of the understory. Shrubs include exotics such as *Berberis thunbergii* (mostly in floodplains and temporarily flooded swamps), *Frangula alnus (= Rhamnus frangula), Ligustrum sinense, Ligustrum vulgare, Rhamnus cathartica*, and *Rosa multiflora* (mostly in floodplains), with occasional generalist native species such as *Cornus amomum* and *Cornus sericea*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Floodplain examples are located along small to large rivers or small streams with alluvial soils that typically flood in early spring. Flooding may persist for as little as seven days, or over a month. Floods may cause scouring and create sandbars, leave silty deposits, fine litter and coarse woody debris on the forest floor. Swamp forests in depressions, along lakeshores or small streams, may have relatively stable saturated or flooded soils, or briefly flood in spring, then draw down. Many flooding regimes have been altered by dams, dikes, and ditches.

ENVIRONMENT

Environmental Description: Central and northern floodplain forests are found along medium to large rivers or along low-gradient reaches of smaller rivers and streams where a flat floodplain develops. A variety of alluvial soil types may be found within the floodplain from very well-drained sandy substrates of alluvial fans and levees to very dense clays in depressions. By contrast central swamp forests encompass various primarily non-alluvial wetlands of the eastern and central United States, including ponds and depressions, as well as various kinds of flatwoods. Flatwoods often contain an impermeable clay layer or fragipan creating a shallow, perched water table; soils are poorly-drained to very poorly-drained, and surface water may be present for extended periods of time, rarely becoming dry. To the west, in the Great Plains, stands occur in floodplains and riparian settings along large to small rivers. Soils are primarily alluvial and range from sandy to clay. To the north, hardwood-conifer swamp occurs on a variety of landforms, including poorly-drained outwash channels and outwash plains and depressions on medium- to coarse-textured end moraines, ground moraines, and glacial lakeplains (Kost et al. 2007). The community occupies sites influenced by groundwater seepage, usually where the water table is at or near the soil surface. Hardwood-conifer swamp occurs on gently sloping to flat topography along headwater streams or in association with relatively inactive portions of floodplains of low order streams, where they form backswamps or occur in meander scars (Tepley et al. 2004).

*Soils/substrate:* This division is found in floodplains and riparian settings along large to small rivers. Soils are primarily alluvial and range from sandy to clay. This macrogroup can occur in deep or shallow river valleys but slopes within stands are typically gentle or nonexistent.

DISTRIBUTION

\*Geographic Range: This division ranges from the western Great Plains east to the Atlantic Coast, north into southern Canada and south to the south-central United States, north of the Gulf Coastal Plain, except along the Mississippi River.

Nations: CA, US

States/Provinces: AB, AL, AR, CO, CT, DC?, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MB, MD, ME, MI, MN, MO, MS, MT, NB, NC, ND, NE, NH, NJ, NM, NS, NY, OH, OK, ON, PA, PE, QC, RI, SC, SD, SK, TN, TX, VA, VT, WI, WV, WY

USFS Ecoregions (2007) [optional]: 211:C, 212:C, 221:C, 222:C, 223:C, 231:C, 232:C, 251:C, 255:C, 315:C, 331:C, 332:C, 342:C, M211:C, M221:C, M223:C, M231:C, M331:C, M334:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M029 | Central Hardwood Floodplain Forest |
| M503 | Central Hardwood Swamp Forest |
| M504 | Laurentian-Acadian-North Atlantic Coastal Flooded & Swamp Forest |
| M028 | Great Plains Flooded & Swamp Forest |
| M302 | Eastern North American Ruderal Flooded & Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Elm-Ash forest (*Ulmus-Fraxinus*), Type 101 | Küchler 1964 | Includes the most extensive swamps in the Midwest (Ohio, Michigan, Indiana) but doesn't include the many minor central swamps. |
| < | Northern floodplain forest (*Populus-Salix-Ulmus*), Type 98 | Küchler 1964 | Swamps and flatwoods are not included in this concept. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: A.W. Kuchler (1964)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S. Menard and D. Faber-Langendoen

Acknowledgments [optional]: Scott Franklin, Chris Lea

Version Date: 27 Oct 2015

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1. Forest & Woodland

1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest

M503. Central Hardwood Swamp Forest

Type Concept Sentence: This swamp forest vegetation encompasses a variety of seepage, wet flatwood and depression, and lake or pond fringe forests (nonriverine) found in the eastern United States and adjacent Canada, primarily exclusive of the coastal plains, dominated by hardwood trees, including *Acer rubrum var. trilobum, Acer saccharinum, Betula nigra, Fagus grandifolia, Fraxinus pennsylvanica, Liriodendron tulipifera, Liquidambar styraciflua, Nyssa biflora, Nyssa sylvatica, Platanus occidentalis, Quercus alba, Quercus bicolor, Quercus lyrata, Quercus michauxii, Quercus palustris*, and *Quercus phellos*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest (D011)

Elcode: M503

\*Scientific Name: *Quercus palustris - Fraxinus pennsylvanica - Nyssa sylvatica* Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Pin Oak - Green Ash - Blackgum Swamp Forest Macrogroup

\*Colloquial Name: Central Hardwood Swamp Forest

\*Type Concept: These swamp forests include seepage, wet flatwood and depression, and lake or pond fringe forests (i.e., not associated with overbank flow from stream or river channels) found in the eastern United States and adjacent Canada, primarily exclusive of the coastal plains. Stands are dominated by hardwood trees, including *Acer rubrum var. trilobum, Acer saccharinum, Betula nigra, Fagus grandifolia, Fraxinus pennsylvanica, Liriodendron tulipifera, Liquidambar styraciflua, Nyssa biflora, Nyssa sylvatica, Platanus occidentalis, Quercus alba, Quercus bicolor, Quercus lyrata, Quercus michauxii, Quercus palustris*, and *Quercus phellos*. The collective range includes the northern glaciated midwestern United States ranging east into Lower New England, south into most of the south-central states, including the broad Appalachian region, the unglaciated Interior Low Plateau, and the Ouachitas and Ozarks. Examples of ~Central Interior-Appalachian Seepage Swamp Group (G044)$$ generally occur where the substrate is saturated to the surface for extended periods during the growing season, but where surface water is seldom present for more than short periods of time. This includes streamhead swales or broad sandstone ridges where soils are sandy and saturated due to a combination of perched water table and seepage flow, as well as seepage-fed wetlands on gentle slopes, with substantial seepage flow which may be influenced by wildland fire, and along the bottom slopes of smaller valleys, as well as in the upper riparian zones of larger creeks, sometimes extending upslope along small ephemeral drainages. Examples of ~South-Central Flatwoods & Pond Forest Group (G654)$$ are found in ponds, wet depressions, flats along small streams, and other related environments. Examples of ~Central Hardwood Flatwoods & Swamp Forest Group (G597)$$ are found in ponds and depressions, and include various kinds of flatwoods (where soils often contain an impermeable clay layer or fragipan creating a shallow, perched water table, soils are poorly drained to very poorly drained, and surface water may be present for extended periods of time, rarely becoming dry).

\*Diagnostic Characteristics: These are generally nonriverine forested wetlands, characterized by hydrologic setting, which includes flat to depressional wetlands, as well as seepage swamps, ponds, flats along small streams, and other related environments. Stands are dominated by a diverse suite of primarily wetland *Quercus* species or other wetland deciduous hardwood trees that vary with biogeography and hydrology. Diagnostic species include *Acer rubrum var. trilobum, Fagus grandifolia, Fraxinus pennsylvanica, Liriodendron tulipifera, Liquidambar styraciflua, Nyssa biflora, Nyssa sylvatica, Platanus occidentalis, Quercus alba, Quercus bicolor, Quercus lyrata, Quercus michauxii, Quercus palustris*, and *Quercus phellos*.

\*Classification Comments: The floristic and hydrologic variation within this diverse macrogroup will be accommodated by the various component groups and alliances.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M504 | Laurentian-Acadian-North Atlantic Coastal Flooded & Swamp Forest |  |
| M302 | Eastern North American Ruderal Flooded & Swamp Forest |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Stands of this macrogroup are composed of broad-leaved deciduous trees. The canopy can range from moderate to dense. The density of shrubs and herbs varies based on the extent of canopy closure, hydrologic regime, and disturbance regime. In the current landscape, most are closed-canopy forests, but with greater fire frequencies they would have varied more in the past.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Stands are dominated by hardwood trees, typical of wet-mesic to wet conditions, including *Acer rubrum var. trilobum, Acer saccharinum, Betula nigra, Fagus grandifolia, Fraxinus pennsylvanica, Nyssa sylvatica, Liriodendron tulipifera, Liquidambar styraciflua, Nyssa biflora, Platanus occidentalis, Quercus alba, Quercus bicolor, Quercus lyrata, Quercus michauxii, Quercus palustris*, and *Quercus phellos*. Understories and ground layers vary with biogeography and hydrology, but some possible shrub components include *Alnus serrulata, Carpinus caroliniana, Cephalanthus occidentalis, Ilex opaca var. opaca* (central), *Eubotrys racemosa, Lyonia lucida, Vaccinium corymbosum*, and *Viburnum nudum*. The herb layer is quite variable. Forbs such as *Boehmeria cylindrica, Impatiens capensis, Rudbeckia laciniata*, and *Saururus cernuus* (central) are also often prominent with various wetland grasses, sedges, and rushes, including *Carex albolutescens, Carex intumescens, Carex joorii, Chasmanthium laxum, Cinna arundinacea*, and others. Large wetland ferns such as *Osmunda cinnamomea* and *Osmunda regalis var. spectabilis* are often prominent. Large *Smilax* tangles sometimes occur, and some examples have substantial amounts of *Sphagnum* spp. There is some floristic variation with latitude and elevation, with southern and lower-elevation associations containing *Magnolia virginiana* and/or *Nyssa biflora*, which are more typical of the coastal plain. In drier examples, *Quercus rubra, Quercus stellata*, and/or *Quercus velutina* may occur. Other species (in drier zones or phases) include *Campsis radicans, Cardamine bulbosa, Croton michauxii var. ellipticus (= Croton willdenowii), Danthonia spicata, Leersia virginica, Manfreda virginica, Gillenia stipulata (= Porteranthus stipulatus)*, and *Pycnanthemum tenuifolium*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: In ~Central Interior-Appalachian Seepage Swamp Group (G044)$$, the presence of seepage is the most important environmental factor. Long-term droughts will affect seepage flow and presumably have an impact on the vegetation. Canopy dynamics are not well-known and potentially may vary substantially over short distances in response to wetness. Wetness clearly limits recruitment of most tree and shrub seedlings to drier microsites in the wettest examples, and fire is also important in some examples. Long-term geomorphic processes may also be important. Headward erosion by small streams, or meandering by larger stream channels, sometimes drains seeps and eliminates the wetland vegetation. In north-central swamps and flatwoods (~Central Flatwoods & Swamp Forest Group (G597)$$), water level dynamics are the most important factor, differentiating them from the surrounding uplands and differentiating the various components from one another. Most depressions and basins have a very limited watershed area, so water comes largely from rainfall. Variation in rainfall patterns will drive variation in duration of flooding, though most basins have an outlet that ultimately limits water depth. Fire is presumably naturally rare in these systems, although they would naturally be exposed to fires spreading from the surrounding uplands. Standing water and lack of continuous fuel would limit fires to the edges of ponds, with greater influence in flatwoods.

ENVIRONMENT

Environmental Description: This wooded wetland vegetation encompasses various primarily non-alluvial wetlands of the eastern and central United States. This diverse suite of communities includes types associated with ponds and depressions, as well as various kinds of flatwoods. Flatwoods often contain an impermeable clay layer or fragipan creating a shallow, perched water table, soils are poorly drained to very poorly drained, and surface water may be present for extended periods of time, rarely becoming dry. These wetlands result from topographic or edaphic circumstances that promote an enhanced hydroperiod at these sites, and this affects both the vegetation and the dynamics. Ponds and flatwoods have some features in common, and are united at this level, but will be discussed separately where this is necessary. Examples of ~Central Interior-Appalachian Seepage Swamp Group (G044)$$ occur in small patches where relatively constant or seasonal seepage water creates wetland conditions. This seepage commonly occurs at the base of slopes on the edge of bottomlands or in headwaters of small streams. Examples also occur on gently sloping hillsides where impermeable soils and slope force shallow groundwater to the surface. The soils are seasonally to permanently saturated, but without substantial standing water. In north-central swamps and flatwoods (~Central Flatwoods & Swamp Forest Group (G597)$$), soils are poorly drained to very poorly drained, and may have a dense clay hardpan or some other impermeable clay layer or fragipan that limits internal drainage and can create a shallow, perched water table. Some soils may be deep (100 cm or more), consisting of peat or muck. Rainwater accumulates in the basins and persists through the wet season, occasionally persisting all year. Some examples become dry, with drought possible during the summer and autumn months. These fluctuating moisture levels can lead to complexes of forest upland and wetland species.

DISTRIBUTION

\*Geographic Range: The collective range includes the northern glaciated midwestern United States and adjacent Canada, ranging east into Lower New England, south into most of the south-central states, including the broad Appalachian region, including the Piedmont, from Alabama to Kentucky, and the Ouachitas and Ozarks of Arkansas and Oklahoma.

Nations: CA, US

States/Provinces: AL, AR, CT, DC?, DE, GA, IA, IL, IN, KY, MA, MD, MI, MO, NC, NH, NJ, NY, OH, OK?, ON, PA, QC, RI, SC, TN, VA, WV

USFS Ecoregions (2007) [optional]: 211E:CC, 211F:CP, 221A:CC, 221B:CP, 221D:CC, 221F:CC, 221H:CC, 221J:CC, 222Jh:CCC, 222Ua:CCC, 222Ue:CC?, 223A:CC, 223D:CC, 223E:CC, 223F:CC, 223G:CC, 231A:CC, 231B:CC, 231C:CC, 231D:CC, 231H:CC, 231I:CC, M221A:CC, M221C:CC, M221D:CC, M223A:CC, M231A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G044 | Central Interior-Appalachian Seepage Swamp |
| G654 | South-Central Flatwoods & Pond Forest |
| G597 | Central Hardwood Flatwoods & Swamp Forest |
| G667 | Northeastern Forest Vernal Pool |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-07-23 | M030 Northern & Central Swamp Forest Macrogroup | M030 split into Central (M503) & Northern (M504) |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D. Faber-Langendoen, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by S. Menard and S. Gawler.

Version Date: 15 Oct 2014

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1. Forest & Woodland

1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest

M504. Laurentian-Acadian-North Atlantic Coastal Flooded & Swamp Forest

Type Concept Sentence: This swamp forest macrogroup of the northeastern and north-central U.S. and southeastern Canada is characterized by a mixture of deciduous trees (*Acer rubrum, Betula alleghaniensis, Fraxinus nigra, Nyssa sylvatica, Ulmus americana*) and coniferous trees (*Chamaecyparis thyoides, Larix laricina, Picea rubens, Pinus strobus, Thuja occidentalis, Tsuga canadensis*) on organic or mineral soils spanning the pH spectrum from acidic to alkaline.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Na. Eastern North American-Great Plains Flooded & Swamp Forest (D011)

Elcode: M504

\*Scientific Name: *Tsuga canadensis - Fraxinus nigra - Chamaecyparis thyoides* Flooded & Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Eastern Hemlock - Black Ash - Atlantic White-cedar Flooded & Swamp Forest Macrogroup

\*Colloquial Name: Laurentian-Acadian-North Atlantic Coastal Flooded & Swamp Forest

\*Type Concept: This swamp forest macrogroup ranges from temperate regions of northwest Ontario east to Atlantic Canada, and from central Minnesota east to northern New England. It includes deciduous and coniferous trees, including *Betula alleghaniensis, Fraxinus nigra, Larix laricina, Picea rubens, Pinus strobus, Thuja occidentalis*, and *Tsuga canadensis* to the north, and *Chamaecyparis thyoides* and *Nyssa sylvatica* to the south, with *Acer rubrum* usually present throughout the range and often strongly dominant in more successional stands. Occasionally, colder conditions favor *Abies balsamea, Picea glauca*, or *Picea mariana*, mixed with temperate trees, shrubs, and herbs. This macrogroup covers a wide pH range, and includes alkaline to circumneutral swamps and floodplains characterized by *Fraxinus nigra, Thuja occidentalis*, and *Ulmus americana* and acidic swamps characterized by *Chamaecyparis thyoides, Picea rubens*, and/or lacking *Thuja occidentalis* and *Fraxinus nigra*. Common shrubs may include *Clethra alnifolia, Gaylussacia dumosa, Ilex glabra, Eubotrys racemosa, Rhododendron viscosum* in the south; *Alnus incana, Ilex mucronata, Viburnum nudum var. cassinoides* in the north, with *Ilex verticillata* and *Vaccinium corymbosum* over much of the range. Ferns may be common, including *Dryopteris cristata, Osmunda cinnamomea, Onoclea sensibilis, Thelypteris palustris*, and others. Sedges and *Sphagnum* mosses are common. Hummock-and-hollow microtopography is characteristic, and trees are often primarily confined to hummocks, with more hydrophytic herbaceous vegetation in hollows. These swamps form in basin wetlands that remain saturated for all or nearly all of the growing season, and may have standing water seasonally. Some occur on gently sloping seepage lowlands, and even basin settings may have some seepage influence, especially near the periphery.

\*Diagnostic Characteristics: Saturated forests with prominent canopy trees including *Acer rubrum* and associates *Chamaecyparis thyoides* or *Pinus rigida* occurring on the Atlantic Coastal Plain from Virginia to southern New England, or *Acer rubrum, Betula alleghaniensis, Fraxinus nigra, Larix laricina, Picea rubens, Thuja occidentalis*, and *Tsuga canadensis* inland and to the north. The shrub and herbaceous layers have a significant component of hydrophytes (facultative to obligate wetland species). Ferns are prevalent within these swamp forests, including *Dryopteris cristata, Osmunda cinnamomea, Onoclea sensibilis, Thelypteris palustris*, and others.

\*Classification Comments: Some species, such as *Clethra alnifolia, Gaylussacia dumosa*, and *Ilex glabra*, have coastal plain affinities.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M503 | Central Hardwood Swamp Forest | occurs to the south and west and is characterized by presence of *Liquidambar styraciflua, Liriodendron tulipifera, Quercus phellos*, and flatwoods species *Quercus palustris* and *Quercus bicolor* in addition to *Acer rubrum*; lacks northern conifers *Picea rubens, Thuja occidentalis*, and lacks *Chamaecyparis thyoides* or *Pinus rigida*. |
| M302 | Eastern North American Ruderal Flooded & Swamp Forest |  |
| M029 | Central Hardwood Floodplain Forest | has floodplain trees such as *Acer saccharinum, Betula nigra, Quercus palustris*, and *Platanus occidentalis*. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Deciduous, mixed, or coniferous canopy ranging from dense to partially open; shrub layer generally well-developed but can be sparse under dense canopy and where deer browse pressure is high. Hummock-and-hollow microtopography is characteristic, and mosses, especially species of *Sphagnum*, are common and usually abundant. Hummocks and decaying nurse logs provide critical substrate for plant establishment and growth.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Acer rubrum* is a relatively constant species throughout the range of these swamps. At the northern end of the range, canopy trees *Betula alleghaniensis, Larix laricina, Picea rubens, Pinus strobus*, and *Tsuga canadensis* are characteristic. *Nyssa sylvatica* can be more important toward the southern end of the range. Occasionally, colder conditions favor *Abies balsamea, Picea glauca*, or *Picea mariana*, mixed with temperate trees, shrubs, and herbs. Typical shrubs include *Alnus incana, Carpinus caroliniana, Cornus* spp., *Ilex verticillata, Lindera benzoin, Ilex mucronata (= Nemopanthus mucronatus), Ribes* spp., *Rubus pubescens, Salix* spp., *Vaccinium corymbosum*, and *Viburnum nudum var. cassinoides*. On the coastal plain, *Picea rubens* and *Larix laricina* are replaced by *Chamaecyparis thyoides* or *Pinus rigida*, with typical shrubs including *Clethra alnifolia, Gaylussacia dumosa, Ilex glabra, Eubotrys racemosa (= Leucothoe racemosa)*, and *Rhododendron viscosum*. Typical herbs across the range of acidic swamps include *Carex folliculata, Carex intumescens, Carex scabrata, Carex stricta, Chelone glabra, Dryopteris cristata, Onoclea sensibilis, Osmunda* spp., *Saxifraga pensylvanica*, and *Symplocarpus foetidus*, among others. Alkaline swamps are limited to the northern portion of the range of this macrogroup and are characterized by *Acer rubrum, Fraxinus nigra, Larix laricina, Thuja occidentalis*, and *Ulmus americana*, with shrubs including *Rhamnus alnifolia* and *Cornus sericea* in addition to the shrubs of northern acidic swamps. Herbaceous species of alkaline swamps include *Caltha palustris, Carex bromoides, Carex leptalea, Geum rivale, Impatiens capensis*, and *Packera aurea*, in addition to many of the acidic swamp species listed above.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: From Slaughter et al. (2007): "The primary natural processes structuring hardwood-conifer swamp are small-scale windthrow and dynamics of surface water and groundwater. Patchy windthrow is the dominant natural disturbance, creating small-scale canopy gaps (Forrester et al. 2005).

"Seedlings of several characteristic hardwood-conifer swamp canopy species (e.g., yellow birch, white pine, northern white-cedar, and hemlock) preferentially germinate and establish on root hummocks and/or decaying logs versus muck or litter-covered depressions (i.e., hollows) (Holcombe 1976, St. Hilaire and Leopold 1995, Rooney and Waller 1998, Allison and Ehrenfeld 1999, McGee 2001, Rooney et al. 2002). In comparison to hollows, hummocks and decaying logs have high moss cover, high moisture content, coarse substrate texture, and stable hydrology, characteristics which may favor the germination and establishment of small seeds with low nutrient reserves (Coffman 1978, St. Hilaire and Leopold 1995, McGee 2001).

"Groundwater and surface water dynamics also shape hardwood-conifer swamp structure and impact succession. Significant hydrological processes impacting hardwood-conifer swamp include groundwater seepage, water table fluctuation, seasonal inundation, and flooding events. "

Logging, especially of *Thuja occidentalis* and *Chamaecyparis thyoides*, has influenced the structure and dominance of this macrogroup. Regeneration of *Chamaecyparis thyoides* is stimulated by fire.

At the present time, excessive deer herbivory threatens the viability of hardwood-conifer swamp throughout its range. High white-tailed deer (*Odocoileus virginianus*) density is leading to considerable browse pressure on conifer seedlings and saplings throughout Michigan and the Great Lakes region (Frelich and Lorimer 1985, Mladenoff and Stearns 1993, Alverson and Waller 1997, Long et al. 1998, Rooney and Waller 1998, Rooney et al. 2002, Krueger and Peterson 2006). Deer browse also reduces frequency and cover of understory shrubs and herbs (Balgooyen and Waller 1995, Augustine and Frelich 1998, Rooney and Waller 2003, Kraft et al. 2004). The result of heavy deer browse is significant alteration of community structure consisting of impacts to all vegetative strata.

ENVIRONMENT

Environmental Description: From Slaughter et al. (2007): "Hardwood-conifer swamp occurs on a variety of landforms, including poorly-drained outwash channels and outwash plains and depressions on medium- to coarse-textured end moraines, ground moraines, and glacial lakeplains (Kost et al. 2007). The community occupies sites influenced by groundwater seepage, usually where the water table is at or near the soil surface. Hardwood-conifer swamp occurs on gently sloping to flat topography along headwater streams or in association with relatively inactive portions of floodplains of low order streams, where it forms backswamps or occurs in meander scars (Tepley et al. 2004). Shallow kettle depressions and the margins of large forested and non-forested peatlands may also support hardwood-conifer swamp, but the community is absent from areas where significant peat accumulation isolates the rooting zone from contact with mineral-rich groundwater." The type may also occur in floodplains. The substrate is either wet mineral soils or peat, and hummocky topography is present. The groundwater ranges from low to high base status.

DISTRIBUTION

\*Geographic Range: This macrogroup ranges from New England west to Minnesota, south along the Appalachian Mountains to Virginia, and east to the Atlantic Coastal Plain.

Nations: CA, US

States/Provinces: CT, DE, IL, IN, MA, MD, ME, MI, MN, NB, NH, NJ, NS, NY, OH, ON, PA, QC, RI, VA, VT, WI, WV

USFS Ecoregions (2007) [optional]: 211Aa:CCC, 211Ab:CCC, 211Ba:CCC, 211Bb:CCC, 211Ca:CCC, 211Cb:CCP, 211Da:CCC, 211Ea:CCC, 211Eb:CCP, 211Ec:CCC, 211Ed:CCC, 211Ee:CCC, 211Fb:CCC, 211G:CC, 211I:CC, 211Ja:CCP, 211Jb:CCP, 211Jc:CCP, 211Jd:CCC, 212Ha:CCC, 212Hb:CCC, 212Hc:CCC, 212Hd:CCC, 212He:CCC, 212Hf:CCC, 212Hg:CCC, 212Hh:CCC, 212Hi:CCC, 212Hj:CCC, 212Hk:CCC, 212Hl:CCC, 212Hm:CCC, 212J:CC, 212L:CC, 212Ra:CCC, 212Rb:CCC, 212Rc:CCC, 212Rd:CCC, 212Re:CCC, 212Sb:CCC, 212Sc:CCC, 212Sn:CCC, 212Sq:CCC, 212Te:CCC, 212Ya:CCC, 212Z:CC, 221Ah:CCC, 221Ai:CCC, 221Ak:CCC, 221Al:CCC, 221B:CC, 221D:CC, 222Ib:CCC, 222Ic:CCC, 222Id:CCP, 222Ie:CCC, 222Ja:CCC, 222K:CC, 222L:CC, 222M:CC, 222Ua:CCC, 222Ud:CCC, 222Ue:CCC, 232A:CC, 232H:CC, M211Aa:CCP, M211Ab:CCC, M211Ac:CCP, M211Ad:CCP, M211Ae:CCC, M211Af:CCC, M211Ba:CCC, M211Bb:CCP, M211Bc:CCC, M211Ca:CCC, M211Cb:CCC, M211Da:CCC, M211Db:CCC, M211Dc:CCC, M211Dd:CCC, M211De:CCC, M221A:CC, M221B:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: Segregated reasonably well in the analyses of eastern U.S. FIA plots (Faber-Langendoen and Menard 2006).

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G653 | Silver Maple - Green Ash - Black Ash Floodplain Forest |
| G039 | Northern Atlantic Coastal Hardwood - Conifer Swamp |
| G045 | Laurentian-Acadian-Appalachian Acidic Swamp |
| G046 | Laurentian-Acadian-Appalachian Alkaline Swamp |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-07-23 | M030 Northern & Central Swamp Forest Macrogroup | M030 split into Central (M503) & Northern (M504) |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Atlantic white cedar wetland | Laderman 1989 |  |
| > | Northern White-Cedar - Hemlock - Red Spruce Conifer Swamp Group | Faber-Langendoen and Menard 2006 |  |
| >< | Red maple swamp | Golet et al. 1993 |  |
| >< | Spring swamp | National Wetlands Working Group 1988 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: L. Sneddon and C. Lea

Acknowledgments [optional]: Sue Gawler authored two groups contributing to this description. Josh Cohen provided additional edits and the extended quoted text from Slaughter et al. (2007). Sean Basquill provided review comments.

Version Date: 05 Jun 2015

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1. Forest & Woodland

1.B.3.Nb. Southeastern North American Flooded & Swamp Forest

D062. Southeastern North American Flooded & Swamp Forest

Type Concept Sentence: These wetland forests occur in a variety of wetland settings, such as floodplain / riparian, isolated basins, and seepage slopes, centered in the Southeastern Coastal Plain of the United States.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.3.Nb. Temperate Flooded & Swamp Forest (F026)

Elcode: D062

\*Scientific Name: *Taxodium distichum - Nyssa biflora - Quercus lyrata* Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Bald-cypress - Swamp Tupelo - Overcup Oak Flooded & Swamp Forest Division

\*Colloquial Name: Southeastern North American Flooded & Swamp Forest

\*Type Concept: The bulk of this division includes wetland forests typically dominated by wetland *Quercus* spp., *Taxodium* spp., and *Nyssa* spp., often with a diverse admixture of other tree species, including *Carya* spp., *Celtis* spp., *Acer* spp., *Fraxinus* spp., *Gleditsia* spp., *Populus* spp., *Salix* spp., *Liquidambar styraciflua, Liriodendron tulipifera, Juglans nigra, Platanus occidentalis, Planera aquatica, Ulmus* spp., and others. Particularly southwards, evergreen conifers and broadleaf species may also be codominant, dominant, or at least present, including *Pinus* spp., *Chamaecyparis thyoides, Magnolia* spp., *Persea palustris, Cyrilla racemiflora, Cliftonia monophylla*, etc. The hydrology of sites varies from temporarily flooded, through seasonally flooded (often of weeks to months), to semipermanently flooded regimes (where there is surficial water for much of the growing season). The canopy is closed (a forest) in most of the communities, but can be a more open woodland, especially in basin swamps and in more deeply flooded communities in the division, in which recruitment is impeded by the frequency and depth of flooding. Many of the characteristic species are endemic to the region, and endemic or nearly so to this division. Characteristic species include *Acer negundo, Acer rubrum, Acer saccharinum, Carya aquatica, Carya illinoinensis, Celtis laevigata, Chamaecyparis thyoides, Fraxinus caroliniana, Fraxinus pennsylvanica, Fraxinus profunda, Gleditsia aquatica, Gleditsia triacanthos, Juglans nigra, Liriodendron tulipifera, Magnolia grandiflora, Magnolia virginiana, Nyssa aquatica, Nyssa biflora, Nyssa ogeche, Nyssa ursina, Persea palustris, Pinus elliottii var. elliottii, Pinus glabra, Pinus serotina, Pinus taeda, Planera aquatica, Platanus occidentalis, Populus heterophylla, Quercus laurifolia, Quercus lyrata, Quercus michauxii, Quercus phellos, Quercus similis, Salix caroliniana, Salix nigra, Taxodium ascendens, Taxodium distichum, Ulmus americana, Ulmus crassifolia*, and others. Lianas are often frequent and diverse, including *Nekemias arborea, Berchemia scandens, Bignonia capreolata, Campsis radicans, Decumaria barbara, Gelsemium rankinii, Gelsemium sempervirens, Parthenocissus quinquefolia*, and *Vitis* spp.; these show a strong tropical affinity with such families as Bignoniaceae, Gelsemiaceae, Vitaceae, and Rhamnaceae. Epiphytic orchids and bromeliads are characteristic and sometimes abundant and diverse in the more southern part of the division's range, but extend in an attenuated and depauperate manner north to southeastern Virginia. Herbaceous layers are sometimes suppressed by flood regimes and dense shade, but some communities in this division are diverse, especially in fire-affected basin swamps with more open canopies and shallow, seasonal flooding. Floristically, this division shows a strong signal of Southeastern North American endemic species and genera, disjunct southeastern Asian / eastern North American elements, widespread temperate elements (variously of North America or broadly northern hemisphere), and with a substantial admixture of neotropical components.

This division is found in the Coastal Plain, which extends from the fall-line to the edge of the continental shelf, and consists of alluvial and marine sediments. Much of the sediment, particularly at the surface, is siliceous alluvium, along with carbonaceous sediment. Common soil orders include sandy Entisols, Inceptisols, and Ultisols. The near-coastal maritime examples are affected by coastal processes, and are prone to salt spray effects and storm surge from major hurricanes. The climate of the coastal plain is humid subtropical, also referred to as warm-temperate, with mean daily temperatures between 0 and 18°C in the coldest month and >22°C in the warmest month. Rainfall is distributed evenly throughout the year, and averages about 100 to 135 cm (40-55 cm a year). This region has the highest frequency of lightning strikes of any region in North America, leading to frequent fires, but unlike in the uplands, fires affect only some of the basin swamp communities in this division.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D011 | Eastern North American-Great Plains Flooded & Swamp Forest |  |
| D324 | Atlantic & Gulf Coastal Plain Pocosin |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The canopy is closed (a forest) in most of the communities, but can be a more open woodland, especially in basin swamps dominated by *Taxodium ascendens*, and in more deeply flooded communities in the division, in which recruitment is impeded by the frequency and depth of flooding. Herbaceous layers are sometimes suppressed by flood regimes and dense shade, but some communities in this division are diverse, especially in fire-affected basin swamps with more open canopies and shallow, seasonal flooding.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Characteristic species include *Acer negundo, Acer rubrum, Acer saccharinum, Carya aquatica, Carya illinoinensis, Celtis laevigata, Chamaecyparis thyoides, Fraxinus caroliniana (= Fraxinus cubensis), Fraxinus pennsylvanica, Fraxinus profunda, Gleditsia aquatica, Gleditsia triacanthos, Juglans nigra, Liriodendron tulipifera, Magnolia grandiflora, Magnolia virginiana, Nyssa aquatica, Nyssa biflora, Nyssa ogeche, Nyssa ursina, Persea palustris, Pinus elliottii var. elliottii, Pinus glabra, Pinus serotina, Pinus taeda, Planera aquatica, Platanus occidentalis, Populus heterophylla, Quercus laurifolia, Quercus lyrata, Quercus michauxii, Quercus phellos, Quercus similis, Salix caroliniana, Salix nigra, Taxodium ascendens, Taxodium distichum, Ulmus americana, Ulmus crassifolia*, and others. Lianas are often frequent and diverse, including *Nekemias arborea (= Ampelopsis arborea), Berchemia scandens, Bignonia capreolata, Campsis radicans, Decumaria barbara, Gelsemium rankinii, Gelsemium sempervirens, Parthenocissus quinquefolia*, and *Vitis* spp.; these show a strong tropical affinity with such families as Bignoniaceae, Gelsemiaceae, Vitaceae, and Rhamnaceae. Epiphytic orchids and bromeliads are characteristic and sometimes abundant and diverse in the more southern part of the division's range, but extend in an attenuated and depauperate manner north to southeastern Virginia.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
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Dynamics: The communities in this division are generally relatively stable in composition and structure. Like all communities in the southeastern United States they are subject to rare catastrophic disturbances such as blowdown from hurricanes or tornados, or extraordinary flood events from hurricanes, northeasters, or frontal events, but they are generally resilient to anything less than truly extraordinary flooding events. Communities in basin swamps located in upland matrix communities (such as longleaf pine-dominated communities) experience low to moderate intensity (but not stand-replacing) fires on an irregular basis, when matrix fires occur in seasons or during years when the community is dry enough to carry fire.

ENVIRONMENT

Environmental Description: *Climate:* The climate of the Coastal Plain is humid subtropical, also referred to as warm-temperate, with mean daily temperatures between 0 and 18°C in the coldest month and >22°C in the warmest month. Rainfall is distributed evenly throughout the year, and averages about 100 to 135 cm (40-55 cm a year). This region has the highest frequency of lightning strikes of any region in North America, leading to frequent fires, but unlike in the uplands, fires affect only some of the basin swamp communities in this division.

*Soils/substrate:* Soils are highly variable. Most soils are recent alluvium, but vary from fertile and nutrient-rich loams associated with brownwater rivers to high-organic, acidic, and nutrient-poor soils associated with blackwater streams and rivers. Some are also on coastal plain terraces of sands, silts, and clays, from Cretaceous to Holocene ages. The hydrology of sites varies from temporarily flooded (of infrequent occurrence and short duration), through seasonally flooded (of more seasonal occurrence, predominantly in the low evapotranspiration season of winter, and of longer duration, often of weeks to months), to semipermanently flooded regimes (where there is surficial water for much of the growing season).

*Biogeography:* Nearly all species in communities of this division are endemic to eastern North America, with many being more restricted endemics of the southeastern United States or the Southeastern Coastal Plain. At higher taxonomic levels (genus and family), the floristic affinities show a strong admixture of (1) Circumboreal temperate elements (*Salix, Pinus, Populus, Quercus*, etc.), relictual temperate elements often with an eastern North America / east Asian disjunct pattern (*Carya, Juglans, Taxodium*, Schisandraceae, etc.), neotropical elements (Bignoniaceae, Gelsemiaceae, *Persea*, Cyrillaceae, *Magnolia* subgenus *Magnolia*), and relictual tropical/subtropical elements (Illiciaceae).

DISTRIBUTION

\*Geographic Range: This division is found predominantly in the Southeast Coastal Plain of the United States, with some outlier examples in adjacent regions.

Nations: US

States/Provinces: AL, AR, CT, DC, DE, FL, GA, IL, IN, KY, LA, MA, MD, MO, MS, NC, NJ, NY, OK, PA, SC, TN, TX, VA, WV

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M161 | Pond-cypress Basin Swamp |
| M033 | Southern Coastal Plain Basin Swamp & Flatwoods |
| M032 | Southern Coastal Plain Evergreen Hardwood - Conifer Swamp |
| M031 | Southern Coastal Plain Floodplain Forest |
| M154 | Southern Great Plains Floodplain Forest & Woodland |
| M310 | Southeastern North American Ruderal Flooded & Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: A.S. Weakley, in Faber-Langendoen et al. (2016)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: A.S. Weakley

Acknowledgments [optional]:

Version Date: 15 Jan 2016

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1. Forest & Woodland

1.B.3.Nb. Southeastern North American Flooded & Swamp Forest

M161. Pond-cypress Basin Swamp

Type Concept Sentence: This is a Southeastern Coastal Plain depression wetland forest or open woodland dominated by the deciduous conifer *Taxodium ascendens*, with shrubs or graminoid understory.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Nb. Southeastern North American Flooded & Swamp Forest (D062)

Elcode: M161

\*Scientific Name: *Taxodium ascendens - Pinus elliottii* Swamp Macrogroup

\*Common (Translated Scientific) Name: Pond-cypress - Slash Pine Swamp Macrogroup

\*Colloquial Name: Pond-cypress Basin Swamp

\*Type Concept: This macrogroup consists of forested depression wetlands, typically dominated by *Taxodium ascendens*, with a characteristic and unique dome-shaped appearance in which trees in the center are generally taller than those around the sides. Examples are known from the Southeastern Coastal Plain of the Carolinas, Georgia, and Florida extending into southern Alabama, Mississippi and southeastern Louisiana. Examples occupy poorly drained, isolated depressions. Remaining examples are usually within a pineland landscape, but some occur in agricultural landscapes. The oldest and largest individual trees typically occupy the center of these domed wetlands, with smaller and younger individuals around the margins. Many Carolina bays have uniformly flat basins such that canopy trees do not have a domed aspect. Some examples are essentially permanently flooded, while others support water levels that vary substantially from year to year and over longer climatic cycles. The wettest sites have open water and floating-leaved aquatic vegetation, or marsh vegetation of tall graminoids. Drier sites often have an open canopy of *Taxodium ascendens*, with evergreen shrubs and often a dense, often fairly species-rich herbaceous layer beneath.

\*Diagnostic Characteristics: Wetland forest or woodland in depressions which are dominated by *Taxodium ascendens*. The vegetation of this macrogroup occurs in the warm-temperate climate region, and in the subtropical region of south Florida. Some examples on lakeshores and edges of large ponds have a canopy of *Taxodium distichum*. These are mostly at the very northern edge of the range in North Carolina and Virginia. These wetlands are not associated with rivers or creeks. Stringers and other examples which are not isolated have only very slowly flowing water.

\*Classification Comments: Flora of North America (FNA Editorial Committee 1993) and other more recent publications (Lickey and Walker 2002, Denny and Arnold 2007) consider *Taxodium ascendens* to be a variety of *Taxodium distichum*, the correct name then being *Taxodium distichum var. imbricarium* (Nuttall) Croom. Some intermediate individuals are found in cypress "stringers" and along small blackwater streams. Cypress "stringers" are more-or-less linear features that are parts of disconnected drainageways that can occur in the swales of ancient coastal topographies in a pine flatwoods landscape (e.g., CEGL007419). The vegetation of the cypress "stringers" is similar to the "dome swamps."

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M310 | Southeastern North American Ruderal Flooded & Swamp Forest |  |
| M067 | Atlantic & Gulf Coastal Plain Wet Prairie & Marsh | includes herbaceous graminoid vegetation in coastal plain depressions, which lack or have very sparse *Taxodium ascendens*. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This is a wetland forest or woodland dominated by the deciduous conifer *Taxodium ascendens*. In the wettest (semipermanently flooded) sites, there is open water and floating-leaved aquatic vegetation under the open canopy of *Taxodium ascendens*. In the sites which are flooded seasonally or for shorter durations, there is usually an evergreen shrub layer of *Ilex* or members of the heath plant family (Ericaceae), or they are dominated by wetland graminoids and forbs with shrubs scattered or confined to the periphery.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Taxodium ascendens* is the characteristic and dominant tree. Other woody species may include *Cephalanthus occidentalis, Clethra alnifolia, Hypericum chapmanii, Hypericum myrtifolium, Ilex amelanchier, Ilex cassine, Ilex coriacea, Ilex myrtifolia, Eubotrys racemosa (= Leucothoe racemosa), Liquidambar styraciflua, Lyonia lucida, Morella cerifera, Nyssa biflora, Pinus elliottii var. elliottii*, and *Styrax americanus* (Drew et al. 1998). Showy, characteristic herbaceous plants in the Carolinas include species of *Ludwigia, Solidago, Symphyotrichum*, and *Xyris* (Bennett and Nelson 1991), as well as *Agalinis linifolia, Boltonia asteroides, Coelorachis rugosa, Dichanthelium wrightianum, Lobelia boykinii, Lycopus amplectens, Pluchea rosea, Polygala cymosa, Rhexia aristosa, Rhynchospora careyana, Rhynchospora filifolia*, and *Scleria reticularis*; and in Florida include *Amphicarpum muehlenbergianum, Carex striata, Carex turgescens, Carex verrucosa, Coreopsis nudata, Lobelia floridana, Lycopus rubellus (= Lycopus angustifolius)*, and *Polygala cymosa*, plus many of those listed for the Carolinas. Many of these species extend westward on the Gulf Coastal Plain to southern Alabama, Mississippi, and southeastern Louisiana. Understory trees and shrubs in southern Florida include *Annona glabra, Chrysobalanus icaco*, and *Ficus aurea*. The wettest sites have open water and floating-leaved aquatic vegetation, or marsh vegetation of tall graminoids.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Variation in hydroperiod is the most important dynamic, causing rapid major changes in the herbaceous vegetation. Unlike the steeper-sided solution depressions, where many different hydroperiods are present within a short distance and vegetation zones simply shift, the flat-bottomed Carolina bays may experience drastic yearly changes in hydroperiod over their extent. The difference between a dry year when graminoids and forbs dominate, and a wet year when emergent sedges, such as *Rhynchospora careyana* dominate, often with floating *Utricularia radiata*, is striking and demands multiple years of inventory to capture a site's diversity. Many (probably most) plants persist in seedbanks for periods of years when conditions are not suitable. Fire is also an important process (Kurz and Wagner 1953, Ewel and Mitsch 1978), spreading into the bays from adjacent uplands when conditions are dry, and burning the vegetation along the shallow edges or even burning the vegetation completely throughout the depression. Fire prevents invasion by less water-tolerant trees during dry periods, and interacts with flooding to affect vegetational composition. Where fire no longer occurs, *Pinus taeda* often invades the ponds or bays. Fire may also be important in preventing buildup of organic matter on the soil surface.

ENVIRONMENT

Environmental Description: *Climate:* The climate is humid, warm-temperate. Average rainfall is 100-150 cm (40-60 inches). Hurricanes and other extreme rainfall events provide for an unpredictable hydrological regime. Rarely, as much as half of a year's rainfall can occur in one week. *Soil/substrate/hydrology:* This macrogroup occurs in isolated wetland depressions called Carolina bays in the Atlantic Coastal Plain. On the Gulf Coastal Plain, these depressions are called limesinks, cypress domes, or cypress ponds. Carolina bays are oriented, oval, shallow depressions with nearly flat bottoms, which range from North Carolina through South Carolina, and into adjacent Georgia. Most Carolina bays in the Outer Coastal Plain occur in sandy sediments and are filled with peat, while most Carolina bays in the Inner Coastal Plain occur in loamy sediments and have mineral soils with clay hardpans. These depressions hold water, due to a combination of rainfall and exposure of a high regional water table. Some are essentially permanently flooded. Others contain water well into the growing season in most years, but water levels vary substantially from year to year and over longer climatic cycles. In any event, it is important to note that pond-cypress swamps are primarily rainfall-fed and are not flooded from river overflow. Fire is an important natural influence during dry periods. Fires may burn out accumulated peat, changing the character of a depression.

DISTRIBUTION

\*Geographic Range: This macrogroup is found on the Southeastern Coastal Plain, from southeastern Virginia, through eastern North and South Carolina, and into Georgia, south Florida, southern Alabama, Mississippi and southeastern Louisiana. Occurrences are numerous and extensive in South Carolina.

Nations: US

States/Provinces: AL, FL, GA, LA, MS, NC, SC, VA

USFS Ecoregions (2007) [optional]: 232B:CC, 232C:CC, 232D:CC, 232G:CC, 232H:C?, 232I:CC, 232J:CC, 232K:CC, 232L:CC, 411A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G036 | Pond-cypress Basin Swamp |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Cypress Savanna | Schafale and Weakley 1990 |  |
| < | Cypress Savanna | Edwards et al. 2013 |  |
| = | Cypress domes, heads, and islands | Christensen 2000 |  |
| = | Cypress pond and strand | Ewel 1990b |  |
| < | Cypress-Gum Ponds | Edwards et al. 2013 |  |
| < | Pond Cypress Domes | Kurz and Wagner 1953 |  |
| < | Pond Cypress Pond | Bennett and Nelson 1991 |  |
| < | Pond Cypress Savanna | Bennett and Nelson 1991 |  |
| = | Pondcypress 100 | Eyre 1980 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: H. Kurz and K.A. Wagner (1953)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C.W. Nordman and R.K. Peet

Acknowledgments [optional]:

Version Date: 07 Oct 2015

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1. Forest & Woodland

1.B.3.Nb. Southeastern North American Flooded & Swamp Forest

M033. Southern Coastal Plain Basin Swamp & Flatwoods

Type Concept Sentence: These are forests of poorly drained basins and wet flats in the coastal plains of the southeastern United States, including nonriverine wetland hardwood forests, dominated by some combination of *Quercus* species and *Nyssa* species, with *Liquidambar styraciflua, Taxodium distichum*, and other trees and shrubs that can tolerate wet conditions.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Nb. Southeastern North American Flooded & Swamp Forest (D062)

Elcode: M033

\*Scientific Name: *Nyssa biflora - Quercus michauxii - Taxodium distichum* Basin Swamp & Flatwoods Macrogroup

\*Common (Translated Scientific) Name: Swamp Tupelo - Swamp Chestnut Oak - Bald-cypress Basin Swamp & Flatwoods Macrogroup

\*Colloquial Name: Southern Coastal Plain Basin Swamp & Flatwoods

\*Type Concept: These are forests of poorly drained basins and wet flats in the coastal plains of the southeastern United States, including nonriverine wetland hardwood forests, dominated by some combination of *Quercus* species and *Nyssa* species, with *Chamaecyparis thyoides, Liquidambar styraciflua, Pinus serotina, Pinus taeda, Taxodium distichum*, and other trees that tolerate wetland conditions. Basin swamps (G038) tend to experience longer periods of saturation and their dominant flora reflects this, with the *Quercus* species including *Quercus laurifolia, Quercus michauxii*, and *Quercus phellos*, with *Nyssa biflora, Nyssa ogeche*, and/or *Nyssa sylvatica*. Wet flatwoods (G130) vary more in their hydroperiod and the associated species sort along this moisture gradient, with more mesic zones including *Quercus alba, Quercus falcata, Quercus michauxii, Quercus nigra, Quercus pagoda*, and *Quercus shumardii*, with *Quercus laurifolia* and *Quercus phellos* in wetter zones. Other woody species that may occur in basin swamps (G038) include *Acer rubrum var. trilobum, Fraxinus profunda, Liriodendron tulipifera*, and *Populus heterophylla*. Typical species in the moderate to dense understory include *Clethra alnifolia, Cyrilla racemiflora, Ilex opaca var. opaca, Lyonia lucida, Magnolia virginiana, Persea palustris*, and *Smilax laurifolia*. Vines are conspicuous components, with important species including *Parthenocissus quinquefolia, Smilax smallii, Toxicodendron radicans, Vitis rotundifolia*, and *Vitis aestivalis*. Herbaceous species in basin swamps are more limited due to the extended hydroperiods, and may include *Carex* spp., *Sphagnum* spp., *Woodwardia areolata*, and *Woodwardia virginica*. Flatwoods may be more diverse, and their ground layers can include *Agrimonia rostellata, Aristolochia serpentaria, Botrychium virginianum, Carex cherokeensis, Chasmanthium sessiliflorum, Clematis virginiana, Clitoria mariana, Dichanthelium boscii, Dioscorea villosa, Elephantopus carolinianus, Elephantopus tomentosus, Geum canadense, Galium circaezans, Passiflora lutea, Phryma leptostachya, Podophyllum peltatum, Ruellia caroliniensis, Sanicula canadensis, Scleria oligantha, Smallanthus uvedalius*, and *Spigelia marilandica*. The environment for this vegetation encompasses two more-or-less distinct habitats types. Basin swamps (G038) occupy large, seasonally inundated nonriverine basins with peaty substrates, as well as less well-defined broad interfluvial flats and smaller areas near headwater streams in the coastal plains. These flatter areas may have some conceptual overlap with wet flatwoods (G130) in terms of their environment. Wet flatwoods (G130) occur in flat terrain where soils are seasonally to nearly semipermanently saturated because of low relief, poor soil drainage, and the seasonally high water table. The hydrology is dominated by groundwater seepage, rainfall and sheetflow. Overbank and tidal flooding, if they occur, have little to no influence on the vegetation. The available soil moisture fluctuates widely throughout the growing season, from saturated to very dry, a condition sometimes referred to as xerohydric or hydroxeric. The largest areas are on broad interfluvial flats; examples also occur on sites above modern floodplains but with poor internal drainage: nonriverine Pleistocene high terraces, as well as in broad, low flats, in small to large depressions, and along small, ill-defined drainages.

\*Diagnostic Characteristics: The combination of the suite of canopy species with nonriverine hydrology helps distinguish this vegetation from related riverine/floodplain vegetation. Examples of this vegetation have generally closed canopies dominated by deciduous trees, particularly *Nyssa* and *Taxodium* in the case of hardwood basin swamps (G038), and *Quercus* and *Pinus* species in the case of pine and hardwood wet flatwoods, but the shrub strata may have a significant broad-leaved evergreen component. The hydrology is nonriverine, with water coming from rainwater and groundwater rather than from overbank flooding. The environmental settings include depressions and wet flats.

\*Classification Comments: Two groups constitute this macrogroup: basin swamps, ~Coastal Plain Hardwood Basin Swamp Group (G038)$$, and wet flatwoods, ~Hardwood - Loblolly Pine Nonriverine Wet Flatwoods Group (G130)$$. The "wet flatwoods" are wetter than dry or mesic flatwoods but not as wet as "basin swamps." This vegetation is also referred to as "nonriverine wet hardwood forest" (Schafale and Weakley 1990). In some examples, *Pinus taeda* may attain greater dominance in relation to hardwoods either due to management (preferential removal of the *Quercus* component) or to other stochastic events (fire, windstorm).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M031 | Southern Coastal Plain Floodplain Forest |  |
| M310 | Southeastern North American Ruderal Flooded & Swamp Forest |  |
| M032 | Southern Coastal Plain Evergreen Hardwood - Conifer Swamp |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: These are generally closed-canopy forests dominated by deciduous trees, particularly *Nyssa* and *Taxodium* in the case of hardwood basin swamps (G038), and *Quercus* and *Pinus* species in the case of pine and hardwood wet flatwoods, but the shrub strata may have a significant broad-leaved evergreen component. Basin swamps (G038) are dominated by broad-leaved deciduous hardwoods with needle-leaved deciduous conifers (*Taxodium* spp.). Wet flatwoods (G130) have generally closed canopies dominated by broad-leaved deciduous trees, particularly *Quercus* species.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Examples of this vegetation are primarily dominated by deciduous hardwood trees, including *Quercus* species and *Nyssa* species, with *Chamaecyparis thyoides, Liquidambar styraciflua, Pinus serotina, Pinus taeda, Taxodium distichum*, and other trees that tolerate wetland conditions. Basin swamps (G038) tend to experience longer periods of saturation and their dominant flora reflects this, with the *Quercus* species including *Quercus laurifolia, Quercus michauxii*, and *Quercus phellos*, with *Nyssa biflora, Nyssa ogeche*, and/or *Nyssa sylvatica*. Wet flatwoods (G130) vary more in their hydroperiod and the associated species sort along this moisture gradient, with more mesic zones including *Quercus alba, Quercus falcata, Quercus michauxii, Quercus nigra, Quercus pagoda*, and *Quercus shumardii*, with *Quercus laurifolia* and *Quercus phellos* in wetter zones. Other woody species that may occur in basin swamps (G038) include *Acer rubrum var. trilobum, Fraxinus profunda, Liriodendron tulipifera*, and *Populus heterophylla*. Typical species in the moderate to dense understory include *Clethra alnifolia, Cyrilla racemiflora, Ilex opaca var. opaca, Lyonia lucida, Magnolia virginiana, Persea palustris*, and *Smilax laurifolia*. Vines are conspicuous components, with important species including *Parthenocissus quinquefolia, Smilax smallii, Toxicodendron radicans, Vitis rotundifolia*, and *Vitis aestivalis*. *Parthenocissus quinquefolia* and *Toxicodendron radicans* may cover the ground, as well as being represented by high-climbing individuals. Herbaceous species in basin swamps are more limited due to the extended hydroperiods, and may include *Carex* spp., *Sphagnum* spp., *Woodwardia areolata*, and *Woodwardia virginica*. Flatwoods may be more diverse, and their ground layers can include *Agrimonia rostellata, Aristolochia serpentaria, Botrychium virginianum, Carex cherokeensis, Chasmanthium sessiliflorum, Clematis virginiana, Clitoria mariana, Dichanthelium boscii, Dioscorea villosa, Elephantopus carolinianus, Elephantopus tomentosus, Geum canadense, Galium circaezans, Passiflora lutea, Phryma leptostachya, Podophyllum peltatum, Ruellia caroliniensis, Sanicula canadensis, Scleria oligantha, Smallanthus uvedalius*, and *Spigelia marilandica*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: In basin swamps (G038), the predominant ecological processes are related to soil texture and moisture and disturbance history. These wetlands hold standing water for variable periods after rainfall events. In the wetter *Taxodium*- and *Nyssa*-dominated vegetation, fire is probably of little ecological significance because the vegetation is not flammable. Without fire as a major factor, most communities probably occur naturally as old-growth multi-aged forests dominated by gap-phase regeneration. Hurricanes may create larger canopy gaps occasionally. Examples in drowned river valleys are subject to influence by rising sea level and can be expected to evolve into tidal swamp systems, sometimes fairly quickly. Some of the sites where this vegetation is found today were formerly occupied by stands of *Chamaecyparis thyoides*. These depended on fire for regeneration of the canopy. The occurrence of fires on the time scale of several decades to a century or more may have determined the mosaic of *Chamaecyparis* forests versus other vegetation types. Some areas may once have been canebrakes, with dominance of *Arundinaria* determined by more frequent fire. Similarly, in wet oak-dominated flatwoods (G130), fire is probably of little ecological significance because the vegetation is not particularly flammable. There is some uncertainty about the role of fire, and low-intensity surface fires may have been ecologically important in some examples. The fire regime in dry and mesic flatwoods may be characterized as medium- to long-interval, low-intensity, and high-severity; and in wetter flatwoods as short-interval, low-intensity, and low-severity (D. Zollner pers. comm. 2006).

ENVIRONMENT

Environmental Description: The environment for this vegetation encompasses two more-or-less distinct habitats types. Basin swamps (G038) occupy large, seasonally inundated nonriverine basins with peaty substrates, as well as less well-defined broad interfluvial flats and smaller areas near headwater streams in the coastal plains. These flatter areas may have some conceptual overlap with wet flatwoods (G130) in terms of their environment. Wet flatwoods (G130) occur in flat terrain where soils are seasonally to nearly semipermanently saturated because of low relief, poor soil drainage, and the seasonally high water table. The hydrology is dominated by groundwater seepage, rainfall and sheetflow. Overbank and tidal flooding, if they occur, have little to no influence on the vegetation. The available soil moisture fluctuates widely throughout the growing season, from saturated to very dry, a condition sometimes referred to as xerohydric or hydroxeric. The largest areas are on broad interfluvial flats; examples also occur on sites above modern floodplains but with poor internal drainage: nonriverine Pleistocene high terraces, as well as in broad, low flats, in small to large depressions, and along small, ill-defined drainages (locally known as "slashes" in Louisiana). Some examples found near small drainageways have hydrology that is not influenced by overbank flooding. Soils may be loamy to clayey, shallow to deep.

DISTRIBUTION

\*Geographic Range: The vegetation of this macrogroup is most abundant in the Atlantic and Gulf coastal plains from southeastern Virginia to Texas, extending down the Florida peninsula; it also extends north along the coast to Long Island, New York, and north in the interior to Arkansas, southeastern Oklahoma, and the Missouri "bootheel."

Nations: US

States/Provinces: AL, AR, DE, FL, GA, LA, MD, MO, MS, NC, NJ, NY, OK, PA, SC, TX, VA

USFS Ecoregions (2007) [optional]: 231Bb:CCC, 231E:CC, 232F:CC, 232La:CCC, 234Ad:CCC, 234E:C?

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G038 | Coastal Plain Hardwood Basin Swamp |
| G130 | Hardwood - Loblolly Pine Nonriverine Wet Flatwoods |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Basin Swamp | FNAI 1990 |  |
| ? | Flatland Hardwood Forest | Marks and Harcombe 1981 |  |
| = | Nonriverine Wet Hardwood Forest | Schafale and Weakley 1990 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M.P. Schafale and A.S. Weakley (1990)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by M.P. Schafale and A.S. Weakley.

Version Date: 15 Oct 2014

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1. Forest & Woodland

1.B.3.Nb. Southeastern North American Flooded & Swamp Forest

M154. Southern Great Plains Floodplain Forest & Woodland

Type Concept Sentence: These floodplain and riparian forests and woodlands are found in the southern Great Plains of the U.S. (south-central and north-central Texas extending into Oklahoma). Characteristic species include those occurring at the southwestern extent of their range (*Acer negundo, Carya illinoinensis, Celtis laevigata var. laevigata, Cornus drummondii, Fraxinus pennsylvanica, Juglans nigra, Platanus occidentalis, Quercus macrocarpa, Quercus shumardii, Salix nigra, Sideroxylon lanuginosum, Taxodium distichum*, and *Ulmus americana*) and the southeastern extent of their range (*Celtis laevigata var. reticulata, Juglans major, Juglans microcarpa, Prosopis glandulosa*, and *Quercus fusiformis*).

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Nb. Southeastern North American Flooded & Swamp Forest (D062)

Elcode: M154

\*Scientific Name: *Carya illinoinensis - Celtis laevigata - Quercus macrocarpa* Floodplain Forest & Woodland Macrogroup

\*Common (Translated Scientific) Name: Pecan - Sugarberry - Bur Oak Floodplain Forest & Woodland Macrogroup

\*Colloquial Name: Southern Great Plains Floodplain Forest & Woodland

\*Type Concept: This macrogroup covers floodplain and riparian vegetation ranging from closed-canopy forests of tall stature in the eastern part of its range to open, short-statured woodlands in the western part of its range. Species composition also varies across the east-west range of this macrogroup, but this concept is based on a core set of characteristic species, including *Carya illinoinensis, Celtis laevigata var. laevigata, Celtis laevigata var. reticulata, Cephalanthus occidentalis, Cornus drummondii, Elymus virginicus, Justicia americana, Panicum virgatum, Platanus occidentalis, Populus deltoides, Salix nigra, Sapindus saponaria var. drummondii, Sideroxylon lanuginosum, Taxodium distichum, Tripsacum dactyloides*, and *Ulmus crassifolia*. Other characteristic species in eastern examples include *Acer negundo, Callicarpa americana, Diospyros virginiana, Forestiera acuminata, Fraxinus pennsylvanica, Gleditsia triacanthos, Ilex decidua, Juglans nigra, Juniperus virginiana, Quercus macrocarpa, Quercus shumardii, Ulmus americana*, and *Viburnum rufidulum*. Other characteristic species in western examples include *Diospyros texana, Fraxinus albicans, Juglans microcarpa, Juniperus ashei, Muhlenbergia lindheimeri, Nassella leucotricha, Prosopis glandulosa, Prunus rivularis, Quercus fusiformis*, and *Ungnadia speciosa*. This vegetation is found in the floodplains of medium and larger rivers, as well as along small and intermittent streams of the East Central Texas Plains, Texas Blackland Prairie, Crosstimbers, and Edwards Plateau ecoregions, extending peripherally into adjacent ecoregions. Environmental processes include alluvial sedimentation and erosion associated with perennial and intermittent streams and rivers. It occurs on large and small floodplains, especially in the eastern (and wetter) parts of its range, and on narrow riparian corridors of intermittent streams becoming particularly dry and flashy in the western parts of the range. Periodic, intermediate flooding and deposition (every 5-25 years) dominate the formation and maintenance of examples along better establish floodplains. Further west, in the drier parts of the Edwards Plateau (including the Stockton Plateau) of Texas, examples are open to closed-canopy, low-statured woodlands and shrublands in scoured, rocky riparian settings. These riparian settings are typically intermittently flooded but may be subirrigated.

\*Diagnostic Characteristics: This macrogroup covers floodplain and riparian vegetation ranging from closed-canopy forests of tall stature in the eastern part of its range to open, short-statured woodlands/shrublands in the western part of its range. Species composition also varies across this east-west range, but this concept is based on a core set of characteristic species, including the trees *Carya illinoinensis, Celtis laevigata var. laevigata, Celtis laevigata var. reticulata, Platanus occidentalis, Populus deltoides, Salix nigra, Sapindus saponaria var. drummondii, Sideroxylon lanuginosum, Taxodium distichum*, and *Ulmus crassifolia*, shrubs *Cephalanthus occidentalis, Cornus drummondii*, and grasses and forbs *Elymus virginicus, Justicia americana, Panicum virgatum*, and *Tripsacum dactyloides*.

\*Classification Comments: Vegetation in this macrogroup varies across an east-west gradient, with eastern components sharing similarities with vegetation occurring farther east, and western components sharing species with vegetation farther west. The macrogroup is described on a core set of species, but these species also range in importance across an east-west gradient. Further information is needed to better describe the macrogroup and its groups. ~Southeastern Great Plains Floodplain Forest Group (G784)$$ is distinctive from groups in ~Southern Coastal Plain Floodplain Forest Macrogroup (M031)$$ at least in part by the lack of species found in the groups of M031 (e.g., *Nyssa* spp.), and the presence of *Quercus macrocarpa, Sapindus saponaria var. drummondii*, and *Ulmus crassifolia*, and the eastern extensions of the range of *Celtis laevigata var. reticulata*.

There are two groups (in two different macrogroups, in two divisions) which may need to be more clearly distinguished from one another floristically and (as much as is possible) biogeographically. These are ~Southeastern Great Plains Floodplain Forest Group (G784)$$ in ~Southern Great Plains Floodplain Forest & Woodland Macrogroup (M154)$$; and ~Great Plains Cottonwood - Green Ash Floodplain Forest Group (G147)$$ in ~Great Plains Flooded & Swamp Forest Macrogroup (M028)$$. The first of these is in 1.B.3.Nb ~Southeastern North American Flooded & Swamp Forest Division (D062)$$, the latter one in 1.B.3.Na ~Eastern North American-Great Plains Flooded & Swamp Forest Division (D011)$$. One problem area is Oklahoma, where G784 and G147 overlap.

Several associations in ~*Carya illinoinensis - Ulmus crassifolia - Celtis laevigata* Floodplain Forest Alliance (A3679)$$ extend this group into Arkansas, Kansas, and Louisiana which is beyond the conceptual boundary of this group and macrogroup. This is peripheral to the core geographic distribution of this group, i.e., the East Central Texas Plains, Texas Blackland Prairie regions, Crosstimbers, and Edwards Plateau ecoregions centered on Texas. More information is needed to determine if the vegetation in Arkansas, Kansas, and Louisiana represents a new association that would be better classified elsewhere.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M029 | Central Hardwood Floodplain Forest |  |
| M028 | Great Plains Flooded & Swamp Forest |  |
| M310 | Southeastern North American Ruderal Flooded & Swamp Forest |  |
| M031 | Southern Coastal Plain Floodplain Forest |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup covers floodplain and riparian vegetation ranging from closed-canopy forests of tall stature in the eastern part of its range to open, short-statured woodlands/shrublands in the western part of its range. Depending on the degree of soil development, herbaceous species may occur as clumps or as a continuous herbaceous layer, and may be quite high, especially in situations where shrub cover is low.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Species composition varies across the east-west range of this macrogroup, but its concept is based on a core set of characteristic species, including the trees *Carya illinoinensis, Celtis laevigata var. laevigata, Celtis laevigata var. reticulata, Platanus occidentalis, Populus deltoides, Salix nigra, Sapindus saponaria var. drummondii (= Sapindus drummondii), Sideroxylon lanuginosum, Taxodium distichum*, and *Ulmus crassifolia*, shrubs *Cephalanthus occidentalis, Cornus drummondii, Amorpha fruticosa*, and grasses and forbs *Andropogon glomeratus, Elymus virginicus, Justicia americana, Panicum virgatum, Tripsacum dactyloides*, and *Verbesina virginica*. Associates of these characteristic species vary across an east-west gradient, with eastern components sharing similarities with vegetation occurring farther east, and western components sharing species with vegetation farther west. Other characteristic species in eastern examples include the trees *Acer negundo, Fraxinus pennsylvanica, Gleditsia triacanthos, Juglans nigra, Quercus macrocarpa, Quercus shumardii*, and *Ulmus americana*, shrubs *Callicarpa americana, Diospyros virginiana, Forestiera acuminata, Ilex decidua, Juniperus virginiana*, and *Viburnum rufidulum*, and vines *Nekemias arborea (= Ampelopsis arborea), Berchemia scandens, Campsis radicans, Parthenocissus quinquefolia*, and *Vitis* spp., and grasses and forbs *Carex* sp., *Chasmanthium latifolium, Chasmanthium sessiliflorum, Clematis pitcheri, Galium* spp., *Geum canadense, Sanicula canadensis*, and *Symphyotrichum drummondii var. texanum*. Other characteristic species in western examples include the trees *Fraxinus albicans (= Fraxinus texensis), Juglans microcarpa, Prosopis glandulosa*, and *Quercus fusiformis*, shrubs *Diospyros texana, Juniperus ashei, Prunus rivularis*, and *Ungnadia speciosa*, vines *Ampelopsis cordata*, and *Parthenocissus heptaphylla*, and grasses and forbs *Cladium mariscus ssp. jamaicense, Eleocharis* spp., *Hydrocotyle* spp., *Muhlenbergia lindheimeri, Nassella leucotricha*, and *Setaria scheelei*. Herbaceous species of the adjacent uplands may also be present, including *Bothriochloa barbinodis (= var. barbinodis), Bouteloua curtipendula, Indigofera lindheimeriana, Leptochloa dubia*, and *Schizachyrium scoparium var. scoparium (= Schizachyrium scoparium ssp. neomexicanum)*.

Along the eastern and northeastern margins of the range of this macrogroup, some stands belonging to more eastern groups may exhibit dominance by eastern taxa such as *Quercus alba, Quercus lyrata, Quercus phellos*, and *Quercus pagoda*; the environment becomes generally and correspondingly drier from east to west with communities containing these moister representatives being constrained to riverbanks and floodplains. Representatives of this macrogroup may vary in the openness of the habitat and physiognomy. There may be an open canopy resulting from flood events and rare fire events. Along the Red River and a few of its tributaries, thin bands of riparian vegetation occurring on sandy floodplain terraces, bluffs and sandbars are significantly different in species composition from riparian communities elsewhere in the region. Occurrences may include *Acer saccharinum* (which probably does not occur in any other basin in Texas), *Juniperus virginiana, Populus deltoides*, and *Salix* spp. (especially *Salix exigua*).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: In eastern examples, periodic and intermediate flooding are the most significant processes, and are expected every 5 to 25 years. Grazing and conversion to agriculture can significantly impact this vegetation, and can lead to its degradation or extirpation. Fire occurs infrequently relative to surrounding systems. Fuels tend to stay moister due to shady conditions and low topographic position. Other disturbances include ice storms/blowdowns, which are capable of setting back small to large patches, as well as beaver pond flooding, which, even though a small-patch event, is expected to cycle throughout the forest over the long term, perhaps at a scale of hundreds or thousands of years. Overgrazing and/or overbrowsing may influence recruitment of overstory species and composition of the understory and herbaceous layers.

ENVIRONMENT

Environmental Description: Some examples of this type occupy relatively broad flats at low topographic positions, along large streams where alluvial deposition dominates, as well as on medium to very small, intermittent to ephemeral drainages, minor intermittent streams, and tributaries. Species composition of these forests are variable and are thought to be dependent on soil and geologic substrates. Some examples may be influenced by fire. Others occur on flashy streams, or frequently inundated floodplains where flooding, rather than fire, is the dominant process. Fuels are variable, and fire-return interval is partially determined by that of the adjacent and surrounding matrix upland vegetation, where consistent fuels are present. The "riparian" components are driven primarily by erosional processes and are affiliated with smaller, higher-gradient streams that may occur on limestone cobbles or flat-bedded limestone of streambeds that are typically intermittently flooded but may be subirrigated by shallow groundwater. "Floodplain terrace" components are driven primarily by depositional processes and are affiliated with larger, lower-gradient rivers and streams. This vegetation is ubiquitous (in appropriate habitats) in the East Central Texas Plains, Texas Blackland Prairie Regions, Crosstimbers, and Edwards Plateau (Level 3 Ecoregions 33, 32, 29 and 30, respectively, *sensu* Griffith et al. (2004)).

DISTRIBUTION

\*Geographic Range: This macrogroup encompasses the floodplain vegetation along large and small rivers in north and south-central Texas in the Edwards Plateau, Texas Blackland Prairies, and East Central Texas Plains ecoregions, and extending peripherally into adjacent ecoregions. The type occurs in portions of the floodplains and tributaries of the Red, Trinity, San Jacinto, Brazos, Colorado, Guadalupe, San Antonio, Nueces, and Lavaca rivers, as well as along minor streams and tributaries in the Colorado, Rio Grande, Guadalupe, San Antonio, and Nueces river drainage basins in the western Edwards and Stockton plateaus of Texas.

Nations: US

States/Provinces: OK, TX

USFS Ecoregions (2007) [optional]: 255B:CC, 255C:CC, 255D:CC, 255E:CC, 315C:CC, 315D:CC, 315E:CP, 315G:CC, 321B:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G784 | Southeastern Great Plains Floodplain Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Sawgrass - Willow | Webster 1950 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J. Teague, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: J. Teague and M. Pyne

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by J. Teague, D. Diamond, and L. Elliott.

Version Date: 15 Jun 2015

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\*References [Required if used in text]:

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1. Forest & Woodland

1.B.3.Nc. Rocky Mountain-Great Basin Montane Flooded & Swamp Forest

D195. Rocky Mountain-Great Basin Montane Flooded & Swamp Forest

Type Concept Sentence: Forested riparian and depressional wetlands dominated by broad-leaved deciduous trees or conifers (or both) that occur at mid to high elevations of the Rocky Mountains, ranges of the Intermountain West and the Colorado Plateau, and in the Sierra Nevada and eastern Cascades.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.3.Nc. Temperate Flooded & Swamp Forest (F026)

Elcode: D195

\*Scientific Name: *Populus angustifolia - Populus balsamifera - Picea engelmannii* Rocky Mountain-Great Basin Montane Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Narrowleaf Cottonwood - Balsam Poplar - Engelmann Spruce Rocky Mountain-Great Basin Montane Flooded & Swamp Forest Division

\*Colloquial Name: Rocky Mountain-Great Basin Montane Flooded & Swamp Forest

\*Type Concept: This division is characterized by forests and woodlands dominated either by montane conifers or riparian phreatophyte broad-leaved deciduous trees, or a mix of the two. *Populus angustifolia, Populus balsamifera*, or *Populus tremuloides* along with *Alnus oblongifolia, Acer grandidentatum* or *Acer negundo* are the characteristic broadleaf dominants. The common montane conifer dominants include species that are somewhat tolerant of wet or saturated soil conditions such as *Abies lasiocarpa, Abies grandis, Picea engelmannii, Picea x albertiana*, and *Picea pungens*, along with somewhat drier site species such as *Juniperus scopulorum, Pseudotsuga menziesii, Pinus contorta*, and *Pinus ponderosa*. Stands commonly have subcanopies or tall-shrub layers that can include *Alnus incana, Betula occidentalis, Betula papyrifera, Cornus sericea, Crataegus douglasii, Crataegus rivularis, Prunus virginiana, Ribes americanum, Rhus trilobata, Salix amygdaloides, Salix boothii, Salix drummondiana*, Salix exigua, Salix lucida ssp. caudata, and *Symphoricarpos albus*. The herbaceous undergrowth can be lush to depauperate depending on the site. Graminoids typically include obligate or facultative wetland species such as *Alopecurus aequalis, Calamagrostis canadensis, Carex aquatilis var. aquatilis, Carex obnupta, Carex pellita, Carex disperma, Carex vesicaria, Deschampsia cespitosa, Eleocharis palustris*, and *Phalaris arundinacea*. Forbs are variable, but wetland indicators are typically present and may include *Callitriche heterophylla, Equisetum arvense, Heracleum maximum, Lysichiton americanus, Mentha arvensis, Mitella breweri, Mitella pentandra, Ranunculus alismifolius, Senecio triangularis*, and *Veratrum californicum*. The climate ranges from cool to cold montane or subalpine. Stands typically range between 1500 and 3300 m in elevation to the south and between 900 and 2000 m farther north. They most often occur in mid- to high-montane riparian zones along moderate- to high-gradient (>2%) streams and rivers. The stands become established in seasonally flooded areas along rocky confined channels or on narrow depositional alluvial bars of unconfined mountain valleys. They also can occur on high-elevation, low- gradient (<3%) meandering streams with broad floodplains. Less commonly, they are associated with depressional wetlands, vernal pools, pond and lake margins, or on seeps on gentle slopes (slope wetlands).

\*Diagnostic Characteristics: Wetland soils supporting forests of broad-leaved deciduous trees and/or conifers along riparian corridors, or surrounding the edges of lakes and marshes or other depressional seeps, at all elevations. Within the context of riparian and forested wetlands, *Populus angustifolia* and *Alnus oblongifolia* are strong diagnostic species in the southern portion of the range and *Populus tremuloides* and *Populus balsamifera* are moderately diagnostic in the northern portion. Among the subcanopy trees and shrubs, *Alnus incana, Betula occidentalis, Crataegus rivularis, Salix boothii*, and *Salix drummondiana* are moderately diagnostic.

\*Classification Comments: Includes both riparian and depressional seep wetlands. And includes riparian forests of Coast Ranges and Sierra Nevada of California but does not include the hot Central Valley riparian forests.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D194 | Rocky Mountain Forest & Woodland |  |
| D013 | Western North American Interior Flooded Forest | occurs further south in warmer, desert climates of western North America. |
| D193 | Vancouverian Flooded & Swamp Forest |  |
| D016 | North American Boreal Flooded & Swamp Forest |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This division is characterized by tall broad-leaved deciduous and conifer trees of 30 m or more. The canopies can range from very open to closed. Tall- and short-shrub layers may be present and sometimes high in cover. The herbaceous layer is commonly dominated by graminoids and may be high in cover, and forbs can also be abundant.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This division is characterized by forests and woodlands dominated either by montane conifers or riparian phreatophyte broad-leaved deciduous trees, or a mix of the two. *Populus angustifolia, Populus balsamifera*, or *Populus tremuloides* along with *Alnus oblongifolia, Acer grandidentatum* or *Acer negundo* are the characteristic broadleaf dominants. The common montane conifer dominants include species that are somewhat tolerant of wet or saturated soil conditions such as *Abies lasiocarpa, Abies grandis, Picea engelmannii, Picea x albertiana (= Picea engelmannii x glauca)*, and *Picea pungens*, along with somewhat drier site species such as *Juniperus scopulorum, Pseudotsuga menziesii, Pinus contorta*, and *Pinus ponderosa*. *Thuja plicata, Tsuga heterophylla, Tsuga mertensiana* and *Pinus flexilis* are also occasional dominants.

Riparian stands commonly have subcanopies or tall-shrub layers that can include *Alnus incana, Betula occidentalis, Betula papyrifera, Cornus sericea, Crataegus douglasii, Crataegus rivularis, Prunus virginiana, Ribes americanum, Rhus trilobata, Salix amygdaloides, Salix boothii, Salix drummondiana, Salix exigua, Salix lucida ssp. caudata*, and *Symphoricarpos albus*. The herbaceous undergrowth can be lush to depauperate depending on the site. Graminoids are commonly dominant under marsh conditions where they can form high-cover stands of obligate or facultative wetland species such as *Alopecurus aequalis, Calamagrostis canadensis, Carex aquatilis var. aquatilis, Carex obnupta, Carex pellita, Carex disperma, Carex vesicaria, Deschampsia cespitosa, Eleocharis palustris*, and *Phalaris arundinacea*. Forbs are variable, but wetland indicators are typically present such as *Callitriche heterophylla, Equisetum arvense, Heracleum maximum, Lysichiton americanus, Mentha arvensis, Mitella breweri, Mitella pentandra, Ranunculus alismifolius, Senecio triangularis*, and *Veratrum californicum*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Reproduction of the broadleaf species is by a combination of seed germination following flood events or clonal via root suckering. Clonal reproduction can be very successful for *Populus* spp. and they are capable of quickly establishing on disturbed wet sites.

ENVIRONMENT

Environmental Description: The local environments of this division are variable but they are all within a cool to cold montane or subalpine climate. Stands typically range between 1500 and 3300 m in elevation to the south and between 900 and 2000 m farther north. They most often occur in mid- to high-montane riparian zones along moderate- to high-gradient (>2%) streams and rivers. The stands become established in seasonally flooded areas along rocky confined channels or on narrow depositional alluvial bars of unconfined mountain valleys (where the water table is typically at or near the soil surface during the growing season). They also can occur on high-elevation, low-gradient (<3%) meandering streams with broad floodplains mixed with wet meadows and wetlands. More uncommonly, they are associated with depressional wetlands, vernal pools, pond and lake margins, or on seeps on gentle slopes (slope wetlands) with poorly drained soils, which are saturated year-round or may have seasonal flooding in the spring.

DISTRIBUTION

\*Geographic Range: This division occurs throughout the northern Interior West from the foothills of the Sierra Nevada and eastern Cascades, the ranges of the Great Basin and Colorado Plateau, and in the Rocky Mountains from southern British Columbia to New Mexico and Arizona.

Nations: CA, MX, US

States/Provinces: AB, AZ, BC, CA, CO, ID, MT, NM, NV, OR, SD, UT, WA, WY

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M034 | Rocky Mountain-Great Basin Montane Riparian & Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-03-29 | D012 Populus (balsamifera, deltoides, fremontii, tremuloides) - Fraxinus latifolia - Thuja plicata Temperate Western North American Flooded & Swamp Forest Division | D012 split into 2 new types (D193 & D195). |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Rocky Mountain Riparian Deciduous Forest | Brown et al. 1979 | This type is a subregional variant of a portion of this division concept. |
| < | Sierran Cascade Riparian Deciduous Forest | Brown et al. 1979 | This type is a subregional variant of a portion of this division concept. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: W.J. Mitsch and J.G. Gosselink (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: E. Muldavin and G. Kittel

Acknowledgments [optional]:

Version Date: 30 Jan 2015

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Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Mitsch, W. J., and J. G. Gosselink. 2000. Wetlands. Third edition. John Wiley & Sons, Inc., New York. 920 pp.

Muldavin, E., P. Durkin, M. Bradley, M. Stuever, and P. Mehlhop. 2000a. Handbook of wetland vegetation communities of New Mexico. Volume I: Classification and community descriptions. Final report to the New Mexico Environment Department and the Environmental Protection Agency prepared by the New Mexico Natural Heritage Program, University of New Mexico, Albuquerque.

1. Forest & Woodland

1.B.3.Nc. Rocky Mountain-Great Basin Montane Flooded & Swamp Forest

M034. Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

Type Concept Sentence: This macrogroup consists of montane riparian and swamp forests and woodlands dominated by cottonwood trees, conifer trees, or a mix with such species as *Acer negundo, Alnus rhombifolia, Picea engelmannii, Picea pungens, Pinus contorta, Pinus ponderosa, Populus angustifolia*, and *Populus balsamifera*. It occurs throughout the Great Basin and Rocky Mountains.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Nc. Rocky Mountain-Great Basin Montane Flooded & Swamp Forest (D195)

Elcode: M034

\*Scientific Name: *Picea engelmannii - Populus angustifolia / Cornus sericea* Riparian & Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Engelmann Spruce - Narrowleaf Cottonwood / Red-osier Dogwood Riparian & Swamp Forest Macrogroup

\*Colloquial Name: Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

\*Type Concept: This macrogroup consists of riparian and permanently saturated forests and woodlands dominated by cottonwood trees conifer trees or a mix. Species typically seen are *Abies grandis, Abies lasiocarpa, Acer negundo, Alnus rhombifolia, Fraxinus latifolia, Juglans major, Juniperus scopulorum, Larix occidentalis, Picea engelmannii, Picea pungens, Pinus contorta, Pinus ponderosa, Populus angustifolia, Populus balsamifera*. Many other tree species may dominate. Stands usually have complex structure of tree shrub and herbaceous layers. Shrubs species include dryland to wetland obligate species and range from *Artemisia* spp. to *Salix* spp., and include *Alnus* spp., *Betula occidentalis*, and *Cornus sericea*. Herbaceous layers can be dominated by forbs, graminoids or be sparsely vegetated, depending on the amount of shading and soil moisture and disturbance history. Dominant herbaceous species include *Asarum caudatum, Athyrium filix-femina, Calamagrostis canadensis, Carex obnupta, Clintonia uniflora, Distichlis spicata, Equisetum* spp., *Gymnocarpium dryopteris, Leymus triticoides, Maianthemum stellatum, Senecio triangularis*, and *Thalictrum fendleri*. Introduced forage species such as *Agrostis stolonifera, Poa pratensis, Phleum pratense*, and *Bromus inermis* can be abundant. This macrogroup occupies interior mountains and valleys at elevations east of the Cascade Range and Sierra Nevada below alpine along streambanks, hillside seeps and floodplain soils that are seasonally wet via high water tables or surface flooding. This macrogroup occurs throughout the Great Basin and Rocky Mountains, from high mountains in New Mexico north into Alberta and British Columbia and from Colorado west to Idaho, Washington, Nevada and Oregon.

\*Diagnostic Characteristics: This macrogroup includes plant communities contiguous to and affected by surface and subsurface hydrologic features of perennial or intermittent lotic and lentic waterbodies and springs/seeps. Facultative or wetland tree species are characteristic and include the cottonwoods, conifers and aspen woodlands that line streams or seeps. These are communities tolerant of periodic flooding and high water tables.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M036 | Interior Warm & Cool Desert Riparian Forest | includes riparian forests of warm deserts of southern California, Arizona and New Mexico and Texas. |
| M035 | Vancouverian Flooded & Swamp Forest | includes riparian and permanently saturated forests of the coastal and maritime climates of the Pacific Northwest. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Open to closed-canopy tall woodlands, often linear plant communities with complex horizontal structure, mostly cold-deciduous trees, but can be conifer-dominated or a mix.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Dominant trees include deciduous broad-leaved trees *Acer negundo, Alnus rhombifolia, Betula papyrifera, Populus angustifolia, Populus balsamifera ssp. trichocarpa*, and *Populus tremuloides*. Coniferous species include *Abies concolor, Abies grandis, Abies lasiocarpa, Larix occidentalis, Juglans major, Juniperus scopulorum, Pinus ponderosa* (occasionally), *Picea engelmannii, Picea pungens, Picea glauca, Pinus contorta, Pseudotsuga menziesii, Thuja plicata*, or *Tsuga heterophylla*. Exotic trees *Elaeagnus angustifolia* and *Tamarix* spp. are common in some stands. Understory shrubs include *Acer glabrum, Alnus incana, Amelanchier alnifolia, Artemisia tridentata, Artemisia cana, Betula occidentalis, Brickellia grandiflora, Cornus sericea, Crataegus douglasii, Crataegus rivularis, Ericameria nauseosa, Oplopanax horridus, Philadelphus lewisii, Physocarpus capitatus, Prunus virginiana, Quercus gambelii, Rhamnus alnifolia, Rhododendron occidentale, Rhus trilobata, Ribes* spp., *Rosa nutkana, Rosa woodsii, Salix drummondiana, Salix geyeriana, Salix exigua, Salix lucida, Salix lasiolepis, Sambucus nigra ssp. caerulea (= Sambucus caerulea), Shepherdia argentea, Symphoricarpos* spp., and others.

Herbaceous undergrowth layers can be dominated by graminoids or forbs and may be sparsely vegetated depending on the amount of overstory shading. Herbaceous species that can be dominate include forbs and ferns such as *Asarum caudatum, Athyrium filix-femina, Callitriche heterophylla, Clintonia uniflora, Dryopteris* spp., *Gymnocarpium dryopteris, Heracleum maximum, Lysichiton americanus, Maianthemum stellatum, Mitella breweri, Mitella pentandra, Ranunculus alismifolius, Senecio bigelovii var. bigelovii, Senecio triangularis, Streptopus amplexifolius, Thalictrum fendleri*, and *Veratrum californicum*; as well as graminoids and fern allies *Alopecurus aequalis, Calamagrostis canadensis, Carex aquatilis var. aquatilis, Carex disperma, Carex obnupta, Carex pellita, Carex vesicaria, Distichlis spicata, Eleocharis palustris, Equisetum arvense, Equisetum arvense, Equisetum* spp., *Leymus triticoides*, and *Phalaris arundinacea*. Introduced forage species such as *Agrostis stolonifera, Bromus inermis, Phleum pratense, Poa pratensis, Trifolium pratense*, and *Trifolium repens* can be abundant.

This floristic information is compiled from several sources that describe specific plant associations from eastern Washington and Oregon (Kovalchik 1987, 1993, Crowe and Clausnitzer 1997), Nevada (Manning and Padgett 1995), Colorado (Kittel et al. 1999b, Carsey et al. 2003b), Montana (Butler 1979, 1985, Malanson and Butler 1984, Hansen et al. 1989, Mincemoyer 2005,), British Columbia (NCC 2002, MacKenzie and Moran 2004), Alberta (NCC 2002), Utah (Padgett et al. 1989, Tuhy et al. 2002), New Mexico and Arizona (Szaro 1989, Muldavin et al. 2000a), and Wyoming (Walford 1996, Walford et al. 2001).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Cottonwood and other deciduous dominants of riparian forests and woodlands require flooding, scour and deposition for germination and maintenance. Historically trees were most often replaced by flooding from which most tree regeneration depends. Stands often germinate on open, wet point bars and other freshly deposited alluvial surfaces at some distance from parent trees. Over time healthy riparian corridor supports several stages of cottonwood communities, reaches with seedling, sapling and mature clumps of cottonwoods are a sign of healthy flooding regime (Kittel et al. 1999b). In winter, rafted ice and logs in flow pulses may cause considerable damage to tree boles. It has been documented that ice sheets formed in shallows around cottonwood seedlings lift and rip seedlings out of the ground with spring flows. Beavers crop younger cottonwood and willows and frequently dam side channels occurring in these stands. In steep-sided canyons, streams typically have perennial flow on mid to high gradients. Grazing and human-modifications to streamflow are major influences in altering structure, composition, and function of these communities.

ENVIRONMENT

Environmental Description: This macrogroup contains riparian, seep and swampy areas mostly associated with streambanks and floodplains of permanent, intermittent and ephemeral streams. It is found between mountain ranges, on mountain hill slopes and well into the mountains to subalpine elevations, but below alpine. They occur in V-shaped, narrow valleys and canyons (where there is cold-air drainage), wide valley bottoms on large floodplains along broad, meandering rivers on alluvial soils. They also can occur on finer soils on pond or lake margins and seeps on gentle slopes. Swamps are poorly drained soils that are saturated year-round or may have seasonal flooding in the spring. Environmental information is compiled from several sources: for eastern Washington and Oregon (Kovalchik 1987, 1993, 2001, Crowe and Clausnitzer 1997), for Nevada (Manning and Padgett 1995), for Colorado (Baker 1988, 1989a, 1989b, 1990, Kittel et al. 1994, 1995, 1999a, 1999b), for Montana (Butler 1979, 1985, Malanson and Butler 1984, Hansen et al. 1989), for British Columbia (MacKenzie and Moran 2004), for Utah (Padgett et al. 1989, Tuhy et al. 2002), for New Mexico and Arizona (Szaro 1989, Muldavin et al. 2000a), and for Wyoming (Walford 1996, Walford et al. 2001).

DISTRIBUTION

\*Geographic Range: This macrogroup occurs in the northern and southern Rocky Mountains, northwestern Wyoming and central Montana, north into the Canadian Rockies of Alberta and British Columbia and west into Idaho, eastern Oregon and Washington, on the east slopes of the Cascades, in mountains surrounding the Columbia River Basin, along major tributaries and the main stem of the Columbia at relatively low elevations except west of the Cascades, on the Colorado Plateau, in the Great Basin basins and ranges as well as the eastern slope of the Sierra Nevada, extending to the mountains of Arizona, New Mexico and into Mexico (Szaro 1989).

Nations: CA, MX, US

States/Provinces: AB, AZ, BC, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G506 | Rocky Mountain-Great Basin Montane Riparian & Swamp Forest |
| G505 | Rocky Mountain-Great Basin Swamp Forest |
| G796 | Northern Rocky Mountain Lowland-Foothill Riparian Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | AC Trembling Aspen Copse | Ecosystems Working Group 1998 |  |
| >< | Black Cottonwood - Willow: 222 | Eyre 1980 |  |
| = | Blue Spruce: 216 | Eyre 1980 | Blue spruce commonly occurs in riparian zones |
| > | CR Black Cottonwood Riparian Habitat Class | Ecosystems Working Group 1998 |  |
| > | Cottonwood - Willow: 235 | Eyre 1980 |  |
| = | ER Engelmann Spruce Riparian | Ecosystems Working Group 1998 |  |
| > | Engelmann Spruce - Subalpine Fir: 206 | Eyre 1980 | Engelmann spruce occurs as a dominant in riparian zones. Swamps dominated by Engelmann spruce occur in G505. |
| > | Inland Freshwater Wooded Swamp | Shaw and Fredine 1971 |  |
| > | Riparian (422) | Shiflet 1994 |  |
| > | Riparian Woodland (203) | Shiflet 1994 | Group and SRM type overlap along eastern Sierran foothills region of California. |
| > | Swamp | National Wetlands Working Group 1988 |  |
| ? | Swamp | Warner and Rubec 1997 |  |
| > | Swamp Wetland Class: Forested | MacKenzie and Moran 2004 |  |
| > | Western Redcedar - Western Hemlock: 227 | Eyre 1980 |  |
| > | Western Redcedar: 228 | Eyre 1980 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel and M.S. Reid

Acknowledgments [optional]:

Version Date: 11 May 2015

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1. Forest & Woodland

1.B.3.Nd. Western North American Interior Flooded Forest

D013. Western North American Interior Flooded Forest

Type Concept Sentence: This lowland riparian forest and woodland type is dominated by broad-leaved deciduous trees (cottonwoods, sycamores, and hackberries) and palms that occur along perennial and intermittent rivers, springs and oases of the California Central Valley, Southwest U.S. deserts, and the Tamaulipan region of south Texas and adjacent Mexico.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.3.Nd. Temperate Flooded & Swamp Forest (F026)

Elcode: D013

\*Scientific Name: *Populus fremontii - Platanus wrightii - Celtis laevigata* Southwest North American Flooded Forest Division

\*Common (Translated Scientific) Name: Fremont Cottonwood - Arizona Sycamore - Sugarberry Southwest North American Flooded Forest Division

\*Colloquial Name: Western North American Interior Flooded Forest

\*Type Concept: This division is characterized by forests and woodlands growing along lowland perennial and seasonally intermittent rivers as well as in spring areas, from the Californian Central Valley and Coast Ranges, through the warm deserts of the Southwest U.S. (Chihuahuan, Sonoran and Mojave), to the Tamaulipan region of south Texas and northeastern Mexico. Elevations range from sea level to 1800 m (6000 feet). Stands are dominated by riparian phreatophyte broad-leaved deciduous trees and occasionally fan palms (conifers are uncommon). Stands typically have multi-layered canopies with various understories of shrubs and herbs (or they can be sparse). Western stands are characterized by *Populus fremontii* and the closely related *Populus deltoides ssp. wislizeni* along with *Platanus racemosa, Platanus wrightii, Juglans major*, and *Juglans californica* as canopy dominants in monotypic to mixed stands. *Celtis laevigata var. reticulata* may also codominate in the canopies, particularly on drier sites. *Fraxinus anomala, Fraxinus velutina, Juglans microcarpa, Salix gooddingii*, and *Salix laevigata* are typical subcanopy tree species. Other riparian trees that can be common include *Acer negundo, Cephalanthus occidentalis, Salix amygdaloides, Salix lasiolepis, Salix lucida*, and *Sapindus saponaria* plus upland species that can tolerate a degree of moist conditions (e.g., *Quercus agrifolia* or *Quercus lobata*). Eastern stands are dominated by riparian trees with Tamaulipan subtropical affinities and include *Celtis laevigata var. laevigata, Salix nigra, Fraxinus berlandieriana, Taxodium mucronatum*, and *Ulmus crassifolia* with *Ebenopsis ebano, Prosopis glandulosa, Celtis ehrenbergiana*, and *Acacia farnesiana* occurring on drier sites. A shrub layer of facultative and obligate wetland species may be present, including *Baccharis salicifolia, Baccharis emoryi, Baccharis salicina, Salix exigua*, and *Salix geyeriana*, particularly in early-successional stands. On drier sites of the floodplain *Forestiera pubescens var. pubescens* and *Shepherdia argentea* may common. The herbaceous layer is variable in composition across the range and can range from very sparse to a rich and luxuriant mix of mesic forbs and graminoids. In riparian areas on serpentine, *Salix breweri, Hesperocyparis sargentii, Frangula californica ssp. tomentella*, and *Umbellularia californica* may be present. Intermixed with the native riparian forests are ruderal forests and scrubs dominated by introduced woody species with *Elaeagnus angustifolia* and *Tamarix* spp. the typical dominants, but *Ailanthus altissima, Eucalyptus* spp., and *Ulmus pumila* may also be codominants. The division also includes palm oases dominated by *Washingtonia filifera* (west) or *Sabal mexicana* (east) with or without riparian deciduous trees.

\*Diagnostic Characteristics: This division is characterized by forests and woodlands dominated by riparian phreatophyte broad-leaved deciduous trees and occasionally palms. They grow along perennial and seasonally intermittent streams and springs in the warm desert (Sonoran and Mojave), Mediterranean and Tamaulipan regions of western North America, at low and moderate elevations. In western stands, strong diagnostic species in the overstory include *Populus fremontii* and the closely related *Populus deltoides ssp. wislizeni* along with *Platanus racemosa, Platanus wrightii, Juglans major*, and *Juglans californica*. Subcanopy strong diagnostics include *Fraxinus anomala, Fraxinus velutina, Juglans microcarpa, Salix gooddingii*, and *Salix laevigata*. Among eastern stands (Tamaulipan), moderate diagnostics include *Fraxinus berlandieriana, Ulmus crassifolia, Ebenopsis ebano*, and *Taxodium mucronatum*. Palm oases are characterized by *Washingtonia filifera* (west) or *Sabal mexicana* (east).

\*Classification Comments: ~Tamaulipan Riparian Scrub Forest Group (G549)$$ in this division is a provisional group in the U.S. and in need of further research - it may be more closely related to Central American & Caribbean flooded forests [see 1.A.4.Ed ~Caribbean-Central American Flooded & Swamp Forest Division (D093)$$]. In California, riparian areas in the mountains of the Sierra Nevada and the northern Coast Ranges are included in 1.B.3.Ng ~Vancouverian Flooded & Swamp Forest Division (D193)$$. Higher montane groups of the Intermountain West and Rocky Mountains are included in the 1.B.3.Nc ~Rocky Mountain-Great Basin Montane Flooded & Swamp Forest Division (D195)$$. They may share some species in the transition to the lowland riparian associations. Some of the associations of 2.C.4.Nb ~Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland Division (D031)$$ and 2.C.4.Nc ~Southwestern North American Warm Desert Freshwater Marsh & Bosque Division (D032)$$ are successional to the woodlands of this division and share several species.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D007 | Californian Forest & Woodland |  |
| D195 | Rocky Mountain-Great Basin Montane Flooded & Swamp Forest | occurs generally further north and/or in more montane environments in western North America. |
| D193 | Vancouverian Flooded & Swamp Forest | occurs in the far western maritime and montane regions of western North America. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Forests and woodlands that can have multi-layered canopies with various understories of shrubs and herbs (or they can be sparse). Tree heights among dominants can reach as much as 50 m (160 feet), but some stands are short-statured and approach shrublands in size. Young stands can be dense but often mature into open woodlands as trees senesce and die. This division also includes oases dominated by evergreen fan palms. A complex shrub and subshrub layer may or may not be present, and the herbaceous layer can vary from luxuriant to sparse in cover.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Western stands are characterized by riparian phreatophyte broad-leaved deciduous trees and occasionally palms; conifers are uncommon. *Populus fremontii* and the closely related *Populus deltoides ssp. wislizeni* along with *Platanus racemosa, Platanus wrightii, Juglans major*, and *Juglans californica* are the characteristic canopy dominants that can form monotypic to mixed stands along streams and river channels. *Celtis laevigata var. reticulata* may also codominate in the canopies, particularly on drier sites. *Fraxinus anomala, Fraxinus velutina, Juglans microcarpa, Salix gooddingii*, and *Salix laevigata* are typical subcanopy tree species. Other riparian trees that can be common include *Acer negundo, Cephalanthus occidentalis, Salix amygdaloides, Salix lasiolepis, Salix lucida*, and *Sapindus saponaria* plus upland species that can tolerate a degree of moist conditions (e.g., *Quercus agrifolia* or *Quercus lobata*). Eastern stands are dominated by riparian trees with Tamaulipan subtropical affinities and include *Celtis laevigata var. laevigata, Salix nigra, Fraxinus berlandieriana, Taxodium mucronatum*, and *Ulmus crassifolia* with *Ebenopsis ebano, Prosopis glandulosa, Celtis ehrenbergiana (= Celtis pallida)*, and *Acacia farnesiana (= Vachellia farnesiana)* occurring on drier sites. When a shrub layer is present, *Baccharis salicifolia, Baccharis emoryi*, and *Forestiera pubescens var. pubescens* are characteristic dominants, but the more widely distributed *Baccharis salicina, Shepherdia argentea, Salix exigua*, and *Salix geyeriana* can also occur either as monotypic or in mixed stands. The herbaceous layer is variable in composition across the range and can range from very sparse to a rich and luxuriant mix of mesic forbs and graminoids. In riparian areas on serpentine substrates, *Salix breweri, Hesperocyparis sargentii (= Cupressus sargentii), Frangula californica ssp. tomentella (= Rhamnus tomentella)*, and *Umbellularia californica* may be present. The division also includes palm oases dominated by *Washingtonia filifera* (west) or *Sabal mexicana* (east) with or without riparian deciduous trees.

Intermixed with the native riparian forests are ruderal forests and scrubs dominated by introduced woody species. *Elaeagnus angustifolia* and *Tamarix* spp. are the typical dominants, but *Ailanthus altissima, Eucalyptus* spp., and *Ulmus pumila* may also be codominants.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: These are disturbance-driven systems where flooding, scour and deposition of new sediments are recurring events at intervals of up to 100 years, and usually much less. Since most of the dominant trees are relatively short-lived (100-150 years), periodic flooding and associated sediment scour are necessary to ensure tree reproduction and stand renewal. Sufficient base flows are also required. Hence, a hydrological regime that has been significantly impacted by dams and channelization leads to deeper groundwater depths, little overbank flooding, phreatophyte stand senescence and replacement by more xerophytic woodlands, shrublands (often the ruderal exotic-dominated communities), or grasslands. Salinity is low in the root zone, but can increase near the surface where evaporation leaves salt accumulations, particularly when flooding becomes infrequent. Fires do not play a significant natural role in these ecosystems.

ENVIRONMENT

Environmental Description: This division occurs along riparian corridors of low-gradient rivers and streams (<1%) with primarily perennial flows, but seasonally intermittent and spring-fed sites are also possible. Stands occur on floodplain bars and terraces where trees can reach river groundwater on a consistent basis during the growing season (there are also localized areas of serpentine river deposits that provide a special environment). Climatically, the division extends from the winter-rainfall-dominated Mediterranean region of California to the summer-rainfall-dominated Chihuahuan Desert and Tamaulipan thornscrub to the east. But it is the winter snow accumulations of upstream watersheds that are critical for delivering rejuvenating spring floods and sustaining base flows through the summer growing season. In the case of *Washingtonia filifera*, a relict species of the Miocene and Pliocene (Vogl and McHargue 1966), permanent subsurface water is required to maintain them. Reproduction of *Washingtonia filifera* is limited by water supply, surface salinity, rainfall, and fire. Fan palms are fire-tolerant, while understory species are not. Other diagnostic phreatophyte trees of the division are also fire-intolerant.

Environments that favor ruderal, exotic-dominated shrublands are commonly related to altered hydrological regimes caused by dam flow regulation and reservoir sediment capture. But species such as *Elaeagnus angustifolia* and *Tamarix* spp. are aggressive invaders even under natural free-flowing conditions.

DISTRIBUTION

\*Geographic Range: This division of lowland river corridors extends from the coastal ranges of southern Oregon, southward to the Coastal Ranges and Central Valley of California, eastward through the Mojave, Sonoran and Chihuahuan Deserts and the Gulf Coastal Plain of south Texas, northward onto the Colorado Plateau into the Great Basin, and south into northern Mexico.

Nations: CA?, MX, US

States/Provinces: AZ, CA, CO, ID, MT, MXBC, MXBS, MXCH, MXCO, MXNU, MXSO, MXTM, ND, NM, NV, OR, SD, TX, UT, WY

USFS Ecoregions (2007) [optional]: 261:?, 262:C, 263:?, 322:P, M261:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M660 | Mexican Interior Riparian Forest |
| M036 | Interior Warm & Cool Desert Riparian Forest |
| M298 | Interior West Ruderal Flooded & Swamp Forest & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Californian Riparian Deciduous Forest and Woodland | Brown et al. 1979 | This type is a subregional variant of a portion of this division concept. |
| < | Interior Southwestern Riparian Deciduous Forest and Woodland | Brown et al. 1979 | This type is a subregional variant of a portion of this division concept. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: W.J. Mitsch and J.G. Gosselink (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: E. Muldavin and G. Kittel

Acknowledgments [optional]:

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Mitsch, W. J., and J. G. Gosselink. 2000. Wetlands. Third edition. John Wiley & Sons, Inc., New York. 920 pp.

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1. Forest & Woodland

1.B.3.Nd. Western North American Interior Flooded Forest

M660. Mexican Interior Riparian Forest

Type Concept Sentence: Riparian woodlands of montane zones of temperate and subtropical Mexico.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Nd. Western North American Interior Flooded Forest (D013)

Elcode: M660

\*Scientific Name: Mexican Interior Riparian Forest Macrogroup

\*Common (Translated Scientific) Name: Mexican Interior Riparian Forest Macrogroup

\*Colloquial Name: Mexican Interior Riparian Forest

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: MX

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

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1. Forest & Woodland

1.B.3.Nd. Western North American Interior Flooded Forest

M036. Interior Warm & Cool Desert Riparian Forest

Type Concept Sentence: This macrogroup covers warm and cold climate riparian and wetland forested vegetation of the southwestern deserts and western interior U.S., including the Tamaulipan area of southern Texas. Some of the dominant trees species of this highly diverse macrogroup include *Vachellia farnesiana, Celtis laevigata, Ebenopsis ebano, Juglans major, Platanus racemosa, Platanus wrightii, Populus deltoides ssp. wislizeni, Populus deltoides ssp. monilifera, Populus fremontii, Prosopis glandulosa, Salix laevigata*, and *Salix gooddingii*. This macrogroup also includes oases dominated by evergreen palms *Washingtonia filifera* or *Sabal mexicana*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Nd. Western North American Interior Flooded Forest (D013)

Elcode: M036

\*Scientific Name: Interior Warm & Cool Desert Riparian Forest Macrogroup

\*Common (Translated Scientific) Name: Interior Warm & Cool Desert Riparian Forest Macrogroup

\*Colloquial Name: Interior Warm & Cool Desert Riparian Forest

\*Type Concept: This macrogroup is of riparian, floodplain, seep and oases dominated by trees. Dominant include *Vachellia farnesiana, Acer negundo, Celtis laevigata, Celtis ehrenbergiana, Cordia boissieri, Diospyros texana, Ebenopsis ebano, Ehretia anacua, Fraxinus velutina, Haematoxylum brasiletto, Juglans major, Leucaena pulverulenta, Parkinsonia aculeata, Platanus racemosa, Platanus wrightii, Populus deltoides ssp. wislizeni, Populus deltoides ssp. monilifera, Populus fremontii, Prosopis glandulosa, Quercus lobata, Sabal mexicana, Salix amygdaloides, Salix gooddingii, Salix laevigata, Sapindus saponaria, Sideroxylon celastrinum, Tecoma stans, Ulmus crassifolia*, and *Washingtonia filifera*. It occurs from sea level to 2300 m (7500 feet) along foothill and mountain canyons and valleys where riparian corridors follow stream courses and spring-fed depressions along canyon waterways and tectonic faultlines. Most of the dominant woody species found in this macrogroup are phreatophytes and require the presence of a seasonally shallow water table. This macrogroup occurs from Central Valley of California south and east through the Sonoran and Chihuahuan deserts to the Rio Grande River, north into valleys of the lower Colorado Plateau, the San Luis Valley of Colorado and east into the western Great Plains and the Tamaulipan region of southern Texas. The Tamaulipan area is floristically variable with some components better classified with subtropical vegetation and others with temperate vegetation, so it is a transitional zone and is included within this macrogroup because of shared habitat, dynamics, physiognomic structure and tree genera.

\*Diagnostic Characteristics: Diagnostic tree species trees include *Cordia boissieri, Diospyros texana, Ebenopsis ebano, Ehretia anacua, Juglans major, Leucaena pulverulenta, Parkinsonia aculeata, Platanus racemosa, Platanus wrightii, Populus deltoides ssp. wislizeni, Populus fremontii, Sabal mexicana, Salix laevigata, Ulmus crassifolia*, and *Washingtonia filifera*.

\*Classification Comments: Currently within the NVC there are no subtropical groups, so for the present time this warm-climate riparian macrogroup appears to be the best placement of ~Tamaulipan Riparian Scrub Forest Group (G549)$$. G549 is related to ~Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland Macrogroup (M076)$$ (J. Evens pers. comm. 2014). In addition, the Tamaulipan area is floristically variable with some components better classified with subtropical vegetation and others with temperate vegetation, so it is a transitional zone. These groups share common habitat, dynamics, physiognomy, and tree genera and all three include endemic palm species. This macrogroup was expanded to include the cool desert range of *Populus fremontii* in Nevada and Utah as well as part of the range of *Populus deltoides ssp. monilifera* that occurs within the interior west and western edge of the Great Plains, skirting around the southern Rocky Mountains, but not into the Great Plains proper.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M031 | Southern Coastal Plain Floodplain Forest | is most closely related to G171. |
| M034 | Rocky Mountain-Great Basin Montane Riparian & Swamp Forest |  |
| M298 | Interior West Ruderal Flooded & Swamp Forest & Woodland |  |
| M076 | Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland | is a shrub and herb wetland, whereas this type is tree-dominated. |

Similar NVC Types General Comments [optional]: Trees in this M036 often occur at low cover in the shrubland stands of ~Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland Macrogroup (M076)$$. Also, M076 shares many ecological and floristic characteristics with M036. The distinction of forest versus shrubland at the class level for riparian associations needs further evaluation.

VEGETATION

Physiognomy and Structure Summary: Open to closed forests of tall and scrubby-height cold-deciduous and broad-leaved evergreen trees, often occurring in multiple layers.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The vegetation is primarily treed with varying height and canopy closure. Dominant tree species include *Vachellia farnesiana (= Acacia farnesiana), Acer macrophyllum, Acer negundo, Alnus rhombifolia, Alnus rubra, Celtis laevigata var. reticulata, Celtis ehrenbergiana (= Celtis pallida), Cephalanthus occidentalis, Cordia boissieri, Diospyros texana, Ebenopsis ebano, Ehretia anacua, Fraxinus velutina, Haematoxylum brasiletto, Juglans major, Leucaena pulverulenta, Parkinsonia aculeata, Platanus racemosa, Platanus wrightii, Populus deltoides ssp. wislizeni, Populus deltoides ssp. monilifera, Populus fremontii, Prosopis glandulosa, Pseudotsuga menziesii, Quercus agrifolia, Quercus lobata, Sabal mexicana, Salix gooddingii, Salix laevigata, Salix nigra, Sapindus saponaria, Taxodium mucronatum, Tecoma stans, Ulmus crassifolia*, and *Washingtonia filifera*. Floristic information was compiled from Brown (1982a), Barbour and Major (1988), MacMahon (1988), Szaro (1989), Dick-Peddie (1993), Holland and Keil (1995), Sawyer and Keeler-Wolf (1995), Muldavin et al. (2000a), Barbour et al. (2007), and Sawyer et al. (2009).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Vegetation is dependent upon at least temporary annual rise in the water table with annual or periodic flooding and associated sediment scour for growth and reproduction (especially for cottonwood and willow species). Permanent subsurface water is required to maintain many of the dominant phreatophytic species and the palm species (*Washingtonia filifera* and *Sabal mexicana*). Palm groves were once common in the lower Rio Grande Valley 130 km (80 miles) from the Gulf of Mexico, but have since largely been converted to agriculture (Clover 1937, Everitt et al. 1996a, Tremblay et al. 2005).

ENVIRONMENT

Environmental Description: This macrogroup consists of riparian corridors along perennial, intermittent and temporarily flooded streams, and arroyos (ramaderos). Stands may occur on isolated springs as well as within-channel spring-fed depressions. Soils are typically coarse alluvial to loam, silt loam or clay loam and are usually somewhat deeper than soils of the surrounding landscape; and some stands occur on serpentine soils. Elevation ranges from sea level up to 2300 m (7500 feet). Environmental information was compiled from several sources: Brown (1982a), Barbour and Major (1988), Barbour et al. (2007), MacMahon (1988), Szaro (1989), Dick-Peddie (1993), Holland and Keil (1995), Sawyer and Keeler-Wolf (1995), Muldavin et al. (2000a), and Sawyer et al. (2009).

DISTRIBUTION

\*Geographic Range: This macrogroup occurs from Oregon's southern Coast Ranges, California's Central Valley, the foothills of the Sierra Nevada east into the Sonoran, Mojave, western Great Plains and Tamaulipan regions of Texas and Mexico.

Nations: MX, US

States/Provinces: AZ, CA, CO, MXBC, MXBS, MXCH, MXCO, MXNU, MXSO, MXTM, NM, NV, OR, TX, UT

USFS Ecoregions (2007) [optional]: 261B:??, 262A:CC, 263A:??, 322A:PP, M261A:CC, M261B:CC, M261C:CC, M261D:CC, M261E:CC, M261F:CC, M261G:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: Tamaulipan area is considered floristically transitional with some components better classified with subtropical vegetation and others with temperate vegetation. While the macrogroup shares common habitat, dynamics, physiognomy and some tree genera, the floristic overlap between the Tamaulipan and other groups within this macrogroup is very limited. G549 has similarities to shrub and herb wetlands in ~Warm Desert Lowland Freshwater Shrubland, Meadow & Marsh Macrogroup (M076)$$, and distinctiveness of these two macrogroups needs review.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G549 | Tamaulipan Riparian Scrub Forest |
| G797 | Western Interior Riparian Forest & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | California Riparian Deciduous Forests and Woodland - 223.3 | Brown et al. 1998 |  |
| > | Sonoran Riparian Oasis Forest - 224.4 | Brown et al. 1998 |  |
| > | Southwestern Riparian Deciduous Forests and Woodland - 223.2 | Brown et al. 1998 |  |
| > | Tamaulipan Interior Swamp and Riparian Forest - 224.3 | Brown et al. 1998 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel, P. Comer, T. Keeler-Wolf, J. Teague

Acknowledgments [optional]:

Version Date: 11 May 2015

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1. Forest & Woodland

1.B.3.Ng. Vancouverian Flooded & Swamp Forest

D193. Vancouverian Flooded & Swamp Forest

Type Concept Sentence: This division is comprised of forested wetlands of temperate maritime climates from southern Alaska to northern California, including riparian forests, rich swamps, and poor peat swamps (dominated by broad-leaved deciduous and needle-leaved trees.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.3.Ng. Temperate Flooded & Swamp Forest (F026)

Elcode: D193

\*Scientific Name: *Populus balsamifera ssp. trichocarpa - Thuja plicata - Callitropsis nootkatensis* Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Black Cottonwood - Western Red-cedar - Alaska-cedar Flooded & Swamp Forest Division

\*Colloquial Name: Vancouverian Flooded & Swamp Forest

\*Type Concept: This division consists of forests and woodlands of wetland and riparian areas of temperate maritime climates from southern Alaska to northern California. It includes lowland and montane riparian forests, forested mineral-soil swamps, and poor swamps ("bog forests"). In lowland riparian forests, broadleaf dominant species are *Acer macrophyllum, Alnus rubra, Populus balsamifera ssp. trichocarpa, Salix lucida ssp. lasiandra*, and/or *Fraxinus latifolia* (in southern part of range), and conifer-dominated species are *Abies grandis, Picea sitchensis*, or *Thuja plicata*. Montane riparian areas are often conifer-dominated by such tree species as *Abies amabilis, Abies concolor, Abies magnifica, Pinus contorta var. murrayana, Populus tremuloides*, and/or *Tsuga mertensiana*. Montane riparian shrub species include *Alnus viridis ssp. sinuata, Ribes bracteosum*, and *Rubus spectabilis*. Treed swamps are small in size and indicative of poorly-drained, saturated to seasonally flooded, mostly mineral soil areas, often in a mosaic of moving and stagnant water and are dominated by any one or a number of conifer species (*Callitropsis nootkatensis, Picea sitchensis, Pinus contorta, Tsuga heterophylla, Tsuga mertensiana*) and broad-leaved deciduous species (*Alnus rubra, Betula papyrifera, Fraxinus latifolia*). Poor swamps ("bog forests") are common in southeastern Alaska and central British Columbia, less so farther south, and occur on poorly-drained peat soils. These are codominated by several conifer species, including *Callitropsis nootkatensis, Picea sitchensis, Pinus contorta var. contorta, Tsuga heterophylla*, or *Tsuga mertensiana*. The tree canopy is moderately open and of poor productivity; there is a high shrub cover composed of conifers, *Gaultheria shallon* and *Vaccinium ovalifolium*.

\*Diagnostic Characteristics: Treed wetlands in a maritime, temperate climate influenced by minerotrophic groundwater, either on mineral or organic soils. The vegetation is dominated by broad-leaved deciduous or needle-leaved trees, over 10% cover, including *Abies amabilis, Acer macrophyllum, Alnus rubra, Callitropsis nootkatensis, Fraxinus latifolia, Picea sitchensis, Pinus contorta var. contorta, Populus balsamifera ssp. trichocarpa, Salix lucida ssp. lasiandra, Tsuga heterophylla, Thuja plicata*, or *Tsuga mertensiana*. Strong diagnostic indicators in the understory are *Carex obnupta, Coptis aspleniifolia, Equisetum telmateia, Maianthemum dilatatum, Ribes bracteosum*, and *Rubus spectabilis*. Moderate diagnostic indicators include *Carex deweyana, Equisetum arvense, Elliottia pyroliflora, Ledum groenlandicum, Lysichiton americanus, Oplopanax horridus, Sambucus racemosa*, and *Tiarella trifoliata*.

\*Classification Comments: Most of the tree species are characteristic of temperate maritime climates and can occur on upland and wetland site conditions. The understory species associated with the wetland sites differ from those of uplands, as do the soil conditions. Although some species can occur in both moist upland and in riparian or swamps sites, the full complement of species on these site conditions differ. *Populus balsamifera ssp. trichocarpa* is mostly restricted to riparian and wetland sites within this division, but can also occur in riparian and swamp communities of ~Rocky Mountain-Great Basin Montane Flooded & Swamp Forest Division (D195)$$; however, the understory floristics differ in cottonwood communities between these two divisions. Higher benches in riparian areas may be sufficiently dry to be placed in the upland ~Vancouverian Forest & Woodland Division (D192)$$.

Low-productivity poor swamps ("bog forests") in this Pacific Coast division are similar to treed bogs, which are placed in ~North American Bog & Fen Division (D029)$$, ~North Pacific Bog & Fen Macrogroup (M063)$$. However, the "bog forests" are more productive and have less cover of key bog indicators such as *Ledum groenlandicum, Myrica gale, Trichophorum cespitosum*, and *Sphagnum* spp. The most common peatmoss of poor swamps is *Sphagnum girgensohnii*. MacKenzie and Moran (2004) use the term Bog to include both ombrotrophic bogs and weakly minerotrophic poor swamps. We place the more productive poor swamps here, recognizing that they may be difficult to distinguish from treed bogs. According to Mackenzie and Moran (2004) poor swamps are more commonly >10 m height with >10% tree cover, and have at least some minerotrophic floristic indicators.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D192 | Vancouverian Forest & Woodland | includes upland forests within the range of D193. Moderately well-drained seepage forest are included in D192. |
| D195 | Rocky Mountain-Great Basin Montane Flooded & Swamp Forest | includes riparian, swamp and bog/fen forests from temperate continental climates of western North America directly to the east of D193. |
| D013 | Western North American Interior Flooded Forest | is composed of riparian, swamp and bog/fen forests south of D193 and D195. |
| D016 | North American Boreal Flooded & Swamp Forest |  |
| D029 | North American Bog & Fen | includes treed and open bogs and fens. In treed bogs, the trees are of lower stature and seldom reach 10 m. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Closed- to open-canopy forests of cold-deciduous trees, evergreen trees, or a mix of deciduous and evergreen trees, often with deciduous or evergreen shrub undergrowth that includes tree regeneration and/or an herbaceous undergrowth layer. Mosses are often abundant, except on sites with frequent flooding or with a predominately deciduous overstory. Poor swamps may have stunted trees, but typically are >10 m in height with >10% cover (Mackenzie and Moran 2004).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Riparian trees occurring throughout most of the range are *Alnus rubra, Picea sitchensis, Populus balsamifera ssp. trichocarpa, Thuja plicata*, and *Tsuga heterophylla*. Additional trees in southern areas include *Acer macrophyllum, Salix lucida ssp. lasiandra, Fraxinus latifolia*, and *Abies grandis*. *Populus balsamifera* is much less common on the islands of southeastern Alaska and off British Columbia due to a lack of larger floodplains. Dominant species of higher montane riparian areas include *Abies amabilis, Abies concolor, Abies magnifica, Picea engelmannii, Pinus contorta var. murrayana, Tsuga mertensiana*, and, more rarely, *Populus tremuloides*. Key understory diagnostics include *Cornus sericea, Maianthemum dilatatum, Oplopanax horridus, Ribes bracteosum* and *Rubus spectabilis*. Swamp tree species may include *Alnus rubra, Betula papyrifera, Callitropsis nootkatensis, Fraxinus latifolia, Picea sitchensis, Pinus contorta var. contorta, Thuja plicata, Tsuga heterophylla*, and/or *Tsuga mertensiana*. Shrub species include *Cornus sericea, Elliottia pyroliflora, Gaultheria shallon* (southern portion of the Alaska distribution only), *Ledum groenlandicum, Oplopanax horridus, Ribes bracteosum, Rubus spectabilis, Spiraea douglasii, Vaccinium ovalifolium*, and/or *Vaccinium uliginosum*. Mosses include various species of the Mniaceae. Trees of poor swamps ("bog forests") are codominated by several species, including *Callitropsis nootkatensis, Pinus contorta var. contorta, Tsuga heterophylla*, or *Tsuga mertensiana*, and, south of Alaska, also *Thuja plicata*. Conifers dominate the shrub layer along with *Gaultheria shallon* and *Vaccinium ovalifolium*. *Coptis aspleniifolia* is a characteristic herb; other herbs include *Cornus unalaschkensis* and *Blechnum spicant*. *Sphagnum girgensohnii* is characteristic on the forest floor, along with *Rhytidiadelphus triquetrus* and *Hylocomium splendens*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Riparian forests are subject to the erosional dynamics of rivers occurring in areas of high precipitation and/or snowmelt, including erosion of banks and upstream benches, and deposition on lower benches and reaches. Some rivers are characterized by broad shifting alluvial riverbanks. Succession on benches initiates with regeneration of willow, black cottonwood or red alder seedlings, with eventual regeneration of conifers. The older or "high" benches are conifer-dominated and are rarely flooded; they are more prone to erosional events. The youngest or "low" benches are continually being formed by deposition; they are composed of young willow, red alder or black cottonwood stands, and are often flooded and strongly influenced by subsurface seepage. The "mid" benches are generally characterized by mixed broad-leaved deciduous and conifer stands and are less frequently flooded and less influenced by subsurface seepage.

Across the forests of this division, windthrow is a key disturbance factor that can result in either single-tree gaps or multi-tree gaps that disturb larger forest areas. Fire is not a significant disturbance factor. In the hypermaritime coastal climates, paludification is a prevailing process and bog formation occurs on many slopes as well as on level areas. Paludification is slowed on steeper terrain where soil drainage is better and disturbance by slope failure or windthrow is frequent.

ENVIRONMENT

Environmental Description: Forests of this division occur on wetland or riparian areas with permanently saturated soils or seasonal water table fluctuations. They occur at low and high elevations throughout the coastal regions of the Pacific Northwest, ranging from sea level to as high as 3300 m (10,000 feet).

*Climate:* This division occurs within a temperate maritime climate.

*Soils/substrate:* Soils range from thin, to poorly-developed and coarse to deep peat. Riparian sites may have frequent flooding, shifting channels, and significant sediment deposition. Poor swamps ("bog forests") are poorly-drained with slow-moving groundwater and on deep organic or gleysolic soils.

*Biogeography:* The species composition of these communities is reasonably uniform over the range. *Abies amabilis* and *Thuja plicata* do not occur in most of the Alaskan part of the range. *Abies amabilis* is absent from the islands of Haida Gwaii. *Abies concolor, Abies grandis, Abies magnifica*, and *Fraxinus latifolia* have a southern distribution. Species of higher elevations include *Abies amabilis, Abies magnifica*, and *Tsuga mertensiana*.

DISTRIBUTION

\*Geographic Range: This division occurs at low and high elevations throughout the coastal regions of the Pacific Northwest from northern California north through British Columbia, Vancouver Island and Haida Gwaii to along the coast of the Gulf of Alaska, including central and southeastern Alaska.

Nations: CA, US

States/Provinces: AK, BC, CA, ID, OR, WA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M035 | Vancouverian Flooded & Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-03-29 | D012 Populus (balsamifera, deltoides, fremontii, tremuloides) - Fraxinus latifolia - Thuja plicata Temperate Western North American Flooded & Swamp Forest Division | D012 split into 2 new types (D193 & D195). |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Fl, Ws | MacKenzie and Moran 2004 | Forested swamps, and flood ecosystems are a subset of the vegetation presented for British Columbia. |
| < | Forest and woodland wetlands | Christy 2004 | Forested wetlands are one section of wetland vegetation of northwestern Oregon. |
| < | Tree-dominated wetlands | Kunze 1994 | Forested wetlands are one section of wetland vegetation of western Washington. |
| < | low-elevation riparian vegetation of Olympic Experimental State Forest | Chappell 1999 | riparian vegetation for one area of Washington state. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D. Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Meidinger and G. Kittel

Acknowledgments [optional]: T. Boucher, C. Chappell, M.S. Reid, and D. Faber-Langendoen

Version Date: 09 Dec 2015

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1. Forest & Woodland

1.B.3.Ng. Vancouverian Flooded & Swamp Forest

M035. Vancouverian Flooded & Swamp Forest

Type Concept Sentence: This macrogroup covers forested wetlands and riparian areas of coastal lowlands and mountains from Oregon north into southern Alaska. It includes cottonwood- and conifer-dominated riparian forests, conifer swamps, and treed peatlands (fens and bogs). Dominant species in lowland riparian areas include *Abies grandis, Acer macrophyllum, Alnus rubra, Fraxinus latifolia, Picea sitchensis, Populus balsamifera ssp. trichocarpa, Salix lucida ssp. lasiandra*, and/or *Thuja plicata*; in montane riparian areas include *Abies amabilis, Abies concolor, Abies magnifica, Pinus contorta var. murrayana, Populus tremuloides*, and/or *Tsuga mertensiana*; and in bogs at a variety of elevations, *Callitropsis nootkatensis, Picea sitchensis, Pinus contorta var. contorta, Tsuga heterophylla*, and *Tsuga mertensiana* are some of the common characteristic tree species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.3.Ng. Vancouverian Flooded & Swamp Forest (D193)

Elcode: M035

\*Scientific Name: Vancouverian Flooded & Swamp Forest Macrogroup

\*Common (Translated Scientific) Name: Vancouverian Flooded & Swamp Forest Macrogroup

\*Colloquial Name: Vancouverian Flooded & Swamp Forest

\*Type Concept: This macrogroup consists of woodlands and forests of wetland and riparian areas. It includes lowland and montane riparian forests, forested mineral-soil swamps, and treed fens and bogs. In lowland riparian forests, broadleaf dominant species are *Acer macrophyllum, Alnus rubra, Populus balsamifera ssp. trichocarpa, Salix lucida ssp. lasiandra*, and/or *Fraxinus latifolia* (in southern part of range), and conifer-dominated types have *Abies grandis, Picea sitchensis*, or *Thuja plicata*. Montane riparian areas are more often conifer-dominated by such species as *Abies amabilis, Abies concolor, Abies magnifica, Pinus contorta var. murrayana, Populus tremuloides*, and/or *Tsuga mertensiana*. Shrubs include *Alnus viridis ssp. sinuata, Oplopanax horridus, Salix* spp., *Spiraea douglasii*, and *Vaccinium uliginosum*. Along the Gulf of Alaska, glacial-fed rivers (uncommon on the islands) have frequent flooding, shifting channels, and significant sediment deposition, and *Picea sitchensis* is the dominant tree. Treed swamps are more common in southeastern Alaska, less so farther south. Swamps are small in size and indicative of poorly drained, mostly mineral soil areas often in a mosaic of moving and stagnant water and are dominated by any one or a number of conifer (*Callitropsis nootkatensis, Picea sitchensis, Pinus contorta, Tsuga heterophylla, Tsuga mertensiana*) and hardwood species (*Alnus rubra, Betula papyrifera, Fraxinus latifolia*) that are capable of growing on saturated or seasonally flooded soils. Treed peatlands (fens and bogs) are common in southeastern Alaska and central British Columbia, less so farther south, and occur on poorly drained peat soils with little to no influence of groundwater. These can be dominated by any one of a number of conifer species (*Callitropsis nootkatensis, Picea sitchensis, Pinus contorta var. contorta, Tsuga heterophylla, Tsuga mertensiana*) that are capable of growing on saturated or seasonally flooded soils. Overstory is often less than 50% cover, but shrub understory can have high cover. Common shrubs include *Elliottia pyroliflora, Gaultheria shallon* (southern portion of the Alaska distribution only), *Ledum groenlandicum*, and *Vaccinium ovalifolium*.

\*Diagnostic Characteristics: Dominance by *Alnus rubra, Callitropsis nootkatensis, Fraxinus latifolia, Picea sitchensis, Pinus contorta var. contorta, Populus balsamifera ssp. trichocarpa, Salix lucida ssp. lasiandra, Tsuga heterophylla, Thuja plicata*, or *Tsuga mertensiana*, and herbaceous indicators of the saturated or floodplain soil conditions such as *Carex deweyana, Lysichiton americanus, Rubus spectabilis, Trichophorum cespitosum*, and/or *Sphagnum* species.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M034 | Rocky Mountain-Great Basin Montane Riparian & Swamp Forest |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Closed- to open-canopy forests of tall or stunted (but at least 5 m in height) cold-deciduous trees, evergreen trees, or a mix of deciduous and evergreen trees, often with deciduous or evergreen shrub undergrowth and/or an herbaceous undergrowth layer.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Riparian and swamp trees occurring throughout most of the range are *Alnus rubra, Betula papyrifera, Callitropsis nootkatensis (= Chamaecyparis nootkatensis), Fraxinus latifolia, Picea sitchensis, Populus balsamifera ssp. trichocarpa, Thuja plicata*, and *Tsuga heterophylla*. Additional trees in southern areas include *Acer macrophyllum, Salix lucida ssp. lasiandra*, and *Abies grandis*. *Populus balsamifera* is much less common on the islands of southeastern Alaska and off British Columbia due to a lack of larger floodplains. Dominant species of higher montane riparian areas include *Abies amabilis, Abies concolor, Abies magnifica, Picea engelmannii, Pinus contorta var. murrayana, Tsuga mertensiana*, and, more rarely, *Populus tremuloides*. Key understory diagnostics include *Cornus sericea, Maianthemum dilatatum, Oplopanax horridus*, and *Rubus spectabilis*. Swamp tree species may include *Alnus rubra, Betula papyrifera, Callitropsis nootkatensis, Fraxinus latifolia, Picea sitchensis, Pinus contorta var. contorta, Thuja plicata, Tsuga heterophylla*, and/or *Tsuga mertensiana*. Shrub species include *Cornus sericea, Elliottia pyroliflora, Gaultheria shallon* (southern portion of the Alaska distribution only), *Ledum groenlandicum (= Rhododendron groenlandicum), Oplopanax horridus, Rubus spectabilis, Spiraea douglasii, Vaccinium ovalifolium*, and/or *Vaccinium uliginosum*. Tree species dominant on peatlands (fens and bogs) are mostly *Pinus contorta var. contorta* or *Callitropsis nootkatensis* but can include some *Tsuga heterophylla, Tsuga mertensiana*, or *Thuja plicata*. *Ledum groenlandicum* is generally the dominant shrub understory species; other shrubs include *Vaccinium uliginosum, Juniperus communis, Myrica gale*, or *Gaultheria shallon*. Low-shrub species include *Empetrum nigrum, Kalmia microphylla*, and *Rubus chamaemorus*. Herbaceous species include sedges such as *Eriophorum angustifolium, Trichophorum cespitosum, Carex livida*, or herbs such as *Sanguisorba officinalis, Triantha glutinosa*, or *Drosera rotundifolia*. Dominant bryophytes include *Sphagnum* spp. and *Racomitrium lanuginosum*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: This macrogroup includes highly disturbed broad shifting alluvial glacial run-off river beds and banks, snowmelt or rainfall driven hydrology rivers that have seasonal rise in soil water tables and overbank flooding to very stable wetlands with groundwater or precipitation that causes no change to surface soils. All sites depend on high moisture content of soils during the growing season. Succession can be large scale post-flood regeneration of many tree seedlings or small single tree-fall microsite gap dynamics.

ENVIRONMENT

Environmental Description: All of the communities within this macrogroup occur within a cool temperate climate and are wetlands or riparian areas with permanently saturated soils or seasonal water table fluctuations. They occur at low and high elevations throughout the coastal regions of the Pacific Northwest, as far inward as tributaries to the Columbia River in Idaho and the Sierra Nevada of California, ranging from sea level to as high as 3300 m (10,000 feet). Soils range from thin, to poorly developed and coarse to deep peat. Riparian settings may have frequent flooding, shifting channels, and significant sediment deposition. Swamps and bogs are mostly small-patch size, but can be extensive in size as well, occurring in glacial depressions or river valleys and are poorly-drained with slow-moving groundwater, and on deep organic or gleysolic soils. Other riparian settings are narrow streambanks lining rocky channels with steep gradients. This environmental information was compiled from several sources: for Alaska (DeMeo et al. 1992, Viereck et al. 1992, Martin et al. 1995, Shephard 1995, DeVelice et al. 1999, Boggs 2002, Boggs et al. 2008b), for Washington (Chappell 1999, Chappell et al. 2001), for Oregon and Washington (Franklin and Dyrness 1973), and for British Columbia (Banner et al. 1993, Green and Klinka 1994, MacKenzie and Moran 2004).

DISTRIBUTION

\*Geographic Range: This macrogroup occurs at low and high elevations throughout the coastal regions of the Pacific Northwest from southern Oregon north through British Columbia, Vancouver Island and Haida Gwaii to along the coast of the Gulf of Alaska, including central and southeastern Alaska. It occurs as far inward as the eastern slope of the Cascades and along tributaries of the Columbia River in Idaho, and in the Sierra Nevada of California.

Nations: CA, US

States/Provinces: AK, BC, CA, ID, OR, WA

USFS Ecoregions (2007) [optional]: 242A:CC, 242B:CC, 342I:CC, M242C:CC, M242D:CC, M261A:CC, M261D:CP, M261G:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G507 | North Pacific Montane Riparian Woodland |
| G851 | North-Central Pacific Lowland Riparian Forest |
| G853 | North-Central Pacific Maritime Swamp Forest |
| G852 | Alaskan Pacific Riparian Forest & Woodland |
| G854 | Alaskan Pacific Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: G. Kittel, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel and D. Meidinger

Acknowledgments [optional]: With contributions from T. Boucher, C. Chappell, M.S. Reid, and D. Faber-Langendoen.

Version Date: 29 Mar 2017

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1.B.4. Boreal Forest & Woodland

Boreal Forest & Woodland (or taiga) is dominated by needle-leaved (usually evergreen, conical-shaped) conifers, and broad-leaved deciduous hardwoods that cover the northern regions of North America and Eurasia, with extended cold winters and short mild summers.

1. Forest & Woodland

1.B.4.Na. North American Boreal Forest & Woodland

D014. North American Boreal Forest & Woodland

Type Concept Sentence: This division is composed of upland forests and woodlands of the boreal and subarctic regions of North America, characterized by the needle-leaved evergreen tree species *Abies balsamea, Abies lasiocarpa, Picea glauca, Picea mariana, Pinus banksiana*, and *Pinus contorta var. latifolia*, as well as the broad-leaved cold-deciduous tree species *Betula papyrifera, Betula neoalaskana, Populus tremuloides*, and *Populus balsamifera*, ranging in a broad latitudinal belt from Alaska to Labrador and Newfoundland.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.4.Na. Boreal Forest & Woodland (F001)

Elcode: D014

\*Scientific Name: *Picea glauca - Picea mariana - Abies balsamea* Forest & Woodland Division

\*Common (Translated Scientific) Name: White Spruce - Black Spruce - Balsam Fir Forest & Woodland Division

\*Colloquial Name: North American Boreal Forest & Woodland

\*Type Concept: This division includes the upland boreal, high montane and subarctic forests and woodlands of North America that occupy a wide latitudinal band from Alaska to Labrador and Newfoundland between the arctic and temperate regions. These are mostly needle-leaved evergreen (conifer) forests and woodlands, although broad-leaved cold-deciduous (hardwood) forests and mixed conifer-hardwood forests are also common. Dominant tree species include the conifers *Abies balsamea, Abies lasiocarpa, Picea glauca, Picea mariana, Pinus banksiana*, and *Pinus contorta var. latifolia*, and the hardwoods *Betula papyrifera, Betula neoalaskana, Populus tremuloides*, and *Populus balsamifera*. Dominance varies across the range of this division, with *Betula neoalaskana, Picea glauca, Picea mariana*, and *Populus tremuloides* dominating Alaska-Yukon boreal forests and woodlands, *Abies lasiocarpa, Betula neoalaskana, Picea glauca, Pinus contorta var. latifolia*, and *Populus tremuloides* dominating west-central boreal forests and woodlands, and *Abies balsamea, Betula papyrifera, Picea mariana, Pinus banksiana*, and *Populus tremuloides* dominating eastern and central forests. Subarctic woodlands are characterized by the prevalence of open-canopied stands of short-statured *Picea mariana* and/or *Picea glauca*. At both latitudinal and elevational treelines, woodlands become very sparsely treed and are interspersed with shrublands or tundra. Over most of the range, excluding the Atlantic maritime, landscape patterns and stand dynamics are driven by stand-replacing fire. In the perhumid to oceanic climates of eastern Quebec and Newfoundland and Labrador, fire frequency is reduced and stand dynamics are largely driven by insect epidemics, especially spruce budworm (*Choristoneura fumiferana*), which primarily attacks *Abies balsamea*. *Picea mariana* is maintained on these landscapes through regular, but less frequent, stand-replacing fire.

Much of the North American boreal region is underlain by the Precambrian Shield. However, west of Saskatchewan, the boreal occurs mostly on the Interior Plains and in the mountainous and high plateau landscapes of the North American Cordillera. In the east, the Gaspé Peninsula and the varied geology of the Maritime provinces and insular Newfoundland are exceptions to the subdued topography and nutrient-poor lithology of the Shield. Regional geologic and topographic features produce an array of local site conditions. Permafrost is rare in the southern range of this type but increases in prevalence northward and at higher elevations. In subarctic woodlands, permafrost-affected terrain is widespread on level landscapes and on northern aspects of upland slopes; active (i.e., freeze/thaw) permafrost layers are typically less than a meter deep.

\*Diagnostic Characteristics: Strong diagnostic tree species are *Abies balsamea, Betula papyrifera, Betula neoalaskana, Picea glauca, Picea mariana, Pinus banksiana*, and *Populus balsamifera*. Moderate diagnostic trees include *Abies lasiocarpa, Pinus contorta var. latifolia*, and *Populus tremuloides*. Some strong to moderate diagnostic understory species include *Maianthemum canadense, Viburnum edule*, and *Vaccinium myrtilloides*. Some understory species with moderate diagnostic value are *Acer spicatum, Clintonia borealis, Diervilla lonicera, Kalmia angustifolia, Leymus innovatus, Lonicera involucrata, Rosa acicularis*, and *Vaccinium angustifolium*.

\*Classification Comments: Tree species in this division are strong diagnostics, and only found in the North American boreal. Eurasian boreal forests have a completely different suite of tree species (Saucier et al. 2015).

In the western boreal forests of Canada, the high montane boreal forests and woodlands (including tree islands) are included here, but the scrub/shrub condition is treated as part of the boreal subalpine (shrub/scrub birch shrublands in ~Western Boreal Scrub Birch Shrubland Group (G356)$$).

The subarctic woodland in western Alaska towards the Bering Sea has a strong maritime influence and differs from that of the arctic timberline, especially with the absence of *Picea mariana*. The western timberline stretches from the vicinity of Kotzebue Sound (at the Arctic Circle) to Katmai National Monument at the base of the Alaska Peninsula (58°N). Well-developed forests extend westward along the floodplains of the major rivers, perhaps encouraged by the lack of permafrost in the active floodplain area.

Areas at the southern limits of the boreal region are termed subboreal. These areas have a flora with both boreal and temperate elements, and although most of the forests in these areas are included in the temperate forest divisions (D194 and D008), some community types, i.e., those with a predominant boreal floristic composition, are placed in this division (D014). There is also some question as to whether high-elevation conifer forests south of the subboreal should be considered as part of D014. These include, for example, subalpine Rocky Mountain and Appalachian spruce - fir forests. At this time, these high-elevation forests of temperate climates are classified in temperate forest and woodland divisions.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D008 | Eastern North American Forest & Woodland | includes predominantly broad-leaved deciduous forests of temperate continental climatic areas that occur to the south and southeast of D014. |
| D194 | Rocky Mountain Forest & Woodland | includes predominantly conifer forests and woodlands of temperate continental climatic areas that occur to the southwest of D014. |
| D192 | Vancouverian Forest & Woodland | includes predominantly conifer forests and woodlands of temperate maritime (coastal) areas that occur to the south and west of the far western range of D014. |
| D016 | North American Boreal Flooded & Swamp Forest | includes floodplain, swamp and bog/fen forests and woodlands over the range of D014. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This division includes woodlands and open- to closed-canopy forests, comprising needle-leaved evergreen (conifer), broad-leaved cold-deciduous (hardwood), and mixed needle-leaved and broad-leaved tree species. Woodlands are characteristic of dry site conditions in the southern boreal, and are the zonal condition of the subarctic and high-elevation boreal. Conifer species dominate northern and high-elevation stands; hardwood tree species are more prevalent in the southern boreal. Stands are generally of a simple structure, as frequent disturbances over much of this type limit development of more complex stand structures. The understory ranges from dense shrub and herb/dwarf-shrub layers to open stands with sparse shrubs and herbs and a continuous feathermoss ground layer. Ericaceous species and regenerating conifer tree species are typically prominent in the shrub and herb/dwarf-shrub layers. The moss layer is usually well-developed, especially under conifer canopies, and is typically lichen-dominated in subarctic woodlands.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Ten tree species, belonging to three evergreen needle-leaved (*Abies, Picea, Pinus*) and two broad-leaved cold-deciduous (*Betula, Populus*) genera, dominate overstory cover in this division. Most of these species occur over much of the range of the division, although geographic predominance does differ and there are some regional species. *Betula neoalaskana, Abies lasiocarpa*, and *Pinus contorta var. latifolia* are western species (although only the first occurs in Alaska, and the latter are common across the central and southern Rocky Mountains); *Abies balsamea* and *Pinus banksiana* occur in the central and eastern range of this type; *Betula papyrifera, Picea glauca, Picea mariana, Populus tremuloides*, and *Populus balsamifera* occur range-wide.

The tree cover of upland eastern forests is characterized by *Abies balsamea* and *Picea mariana*, often mixed with *Betula papyrifera* and/or *Populus tremuloides* depending upon disturbance history. In the boreal forests of Ontario and western Quebec, *Pinus banksiana* is common and *Populus tremuloides* is more prevalent on the landscape than is *Betula papyrifera*, which is the dominant hardwood in Atlantic boreal forests. *Populus tremuloides* and *Abies balsamea* become less common northwards. *Picea glauca*, which is common but rarely dominant in the eastern boreal, is the dominant upland spruce in western boreal forests, except in the subarctic where *Picea mariana* is also prevalent. *Pinus contorta var. latifolia* is typically dominant in early-seral, post-fire Canadian western boreal forests (but it is absent from Alaska and northern Yukon). *Populus tremuloides* is the most common hardwood species in the west, although *Betula papyrifera* also occurs. *Betula neoalaskana* is common in Alaska, Yukon and northern British Columbia. *Populus balsamifera* co-occurs on moist, generally nutrient-rich sites throughout the full range of this division. *Abies lasiocarpa* is found in the cordillera, particularly at higher elevations where it codominates with *Picea glauca*. *Larix laricina* occurs occasionally in the upland forests of this division. Subarctic woodlands are generally dominated by *Picea mariana* or *Picea glauca*, the latter especially west of Manitoba.

Shrub composition varies considerably across the range of this division. Common shrubs of west-central forests are *Shepherdia canadensis, Rosa acicularis*, and *Viburnum edule*, along with the dwarf-shrub *Vaccinium vitis-idaea*. Common dwarf-shrubs of Alaska and the Yukon are *Vaccinium uliginosum* and *Empetrum nigrum*. Eastern forest understories are characterized by shrub species such as *Kalmia angustifolia, Vaccinium angustifolium, Acer spicatum*, and *Diervilla lonicera*. Subarctic and subalpine woodlands can have well-developed shrub layers of *Betula nana/glandulosa* and various willows (e.g., *Salix glauca, Salix pulchra, Salix richardsonii*).

Common herb species are *Aralia nudicaulis, Cornus canadensis*, and *Maianthemum canadense*. *Clintonia borealis* is found in eastern forests, while *Chamerion angustifolium* and *Calamagrostis canadensis* are more common in west-central forests. *Arctostaphylos rubra (= Arctous rubra)* frequently occurs in forests and woodlands of Alaska and Yukon. *Festuca altaica* is a common grass in subalpine and subarctic woodlands.

Conifer-dominated forests generally have a low cover of shrubs and herbs and a well-developed feathermoss mat covering the ground, composed mostly of *Pleurozium schreberi, Hylocomium splendens*, and/or *Ptilium crista-castrensis*; other species include *Abietinella abietina, Dicranum* spp., and *Polytrichum* spp. *Hylocomium splendens* dominates western forests; *Pleurozium schreberi* dominates eastern forests. The liverwort *Bazzania trilobata* can be abundant in Atlantic maritime regions. Lichens, such as *Cladonia stellaris (= Cladina stellaris), Cladonia arbuscula ssp. mitis (= Cladina mitis)* and *Stereocaulon* spp., become important in the ground layer when the forest cover is more open, and they dominate the ground cover in subarctic woodlands. Subalpine woodlands also have these lichen species but the ground layer is dominated by *Hylocomium splendens*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Over most of the range of this division, landscape patterns and stand dynamics are driven by stand-replacing fire (Kenkel et al. 1997, Payette et al. 2008). In the perhumid to oceanic climates of eastern Quebec and Newfoundland and Labrador, fire frequency is reduced and stand dynamics are largely driven by insect epidemics. Northern and high-elevation woodlands can burn less frequently and intensely due to the open stands and their occurrence in cooler environments.

Lightning-caused fires are the most widespread form of natural disturbance in the boreal, particularly in the west (Stockdale 2014), where fire-return intervals can range from about 60 to 120 years. Fires can also be very large in this region. The number and frequency of fires in boreal forests create a mosaic of stands of various ages and composition. Regeneration after fire depends on many factors (Bergeron et al. 2014), including site moisture, post-fire seedbed conditions, species ability to regenerate vegetatively, and seed source. Frequent fires favor *Picea mariana, Pinus banksiana, Pinus contorta, Betula papyrifera*, and *Populus tremuloides*, because of their serotinous or semi-serotinous cones or ability to reproduce vegetatively. If available from unburned refugia, *Picea glauca* seeds also germinate well on mineral seedbeds that are often prepared by fire. *Abies balsamea* and *Abies lasiocarpa* do not do well in areas of frequent burning because they lack adaptations for regeneration following severe fire. *Abies lasiocarpa* is most prevalent at higher elevations of the western Cordillera where fires are less frequent due to cooler temperatures and greater precipitation.

In the moister climates of the eastern boreal, especially in eastern Quebec and the Canadian Atlantic provinces, fires are less frequent (Bergeron et al. 2001) and stand dynamics are primarily driven by insect epidemics, especially by spruce budworm (*Choristoneura fumiferana*) (Baskerville 1975) or hemlock looper (*Lambdina fiscellaria*) (Iqbal et al. 2011). These insects primarily attack *Abies balsamea*, killing adult trees; however, balsam fir stands typically regenerate from a bank of seedlings in the understory. *Betula papyrifera* and *Picea mariana* are maintained on these landscapes by regular, but infrequent, stand-replacing fire. *Abies balsamea* is extremely shade tolerant and regenerates by seed under closed canopies, so with a long fire cycle stands can succeed over time to dominance by *Abies balsamea*. In the absence of fire, *Abies balsamea* can self-replace in the canopy by gap dynamics and *Picea mariana* can regenerate by layering, which is facilitated when the humus thickness increases, thereby perpetuating the black spruce - balsam fir mixture. Bergeron and Fenton (2012) found that in the Eastern Boreal Forest ecozones stands >200 years occupied 20-25% of the landscape, and stands >300 years, some 10-15% of the landscape.

In Atlantic boreal forests, *Picea glauca* may be favored during insect epidemics, as it is more resistant to spruce budworm defoliation than is *Abies balsamea*. *Picea glauca* can also become abundant along coastlines exposed to salt sprays where it often forms dense short, even prostrate, stands. On Anticosti Island, *Picea glauca* has replaced *Abies balsamea* as the main tree cover due to grazing pressure from very high populations of white-tailed deer (*Odocoileus virginianus)* (Côté et al. 2008). Similar conditions have developed in Newfoundland due to moose browsing.

In subarctic woodlands, grazing and trampling by woodland caribou is localized. However, considerable impact has been recorded in northern Quebec and Labrador when population increases of the George River caribou herd in the 1970s resulted in overgrazing of lichen species (Boudreau and Payette 2004). Grazed areas dominated by *Cladina* spp., particularly *Cladina stellaris*, were replaced by crustose lichens, *Cladonia* spp., *Cetraria* spp., or, in areas of lighter grazing, *Stereocaulon* spp.

In recent years, mountain pine beetle (*Dendroctonus ponderosae*) has caused significant mortality to *Pinus contorta var. latifolia* forests throughout temperate British Columbia (Safranyik and Wilson 2006) and is now spreading northward and eastward into boreal *Pinus contorta* forests, affecting even hybrid *Pinus contorta x banksiana* and *Pinus banksiana* stands in northern Alberta (Nealis and Cooke 2014).

Although the latitudinal treeline has been relatively stable over the last century, it is known from macro-fossil evidence and radiocarbon dating that the treeline was at least 200-300 km north of its present position during the post-glacial climatic optimum (1000-4000 BP). The recession of the treeline is considered to be related to cooler and drier climates that resulted in an increase in fire frequency and a decrease in the capacity of trees to produce viable seeds for successful regeneration at their former positions. The latitudinal treeline is rarely a sharp line but rather a gradual transition to "treed tundra" where arctic-alpine species may occur in the ground vegetation. Short-term fluctuating advances and retreats in tree regeneration with seasonal variation in temperature and moisture have been recorded, and recent reports suggest that there will be directional shift of the treeline further north with climate warming.

Agricultural clearing, forest harvesting and other industrial activities (chiefly petroleum and mining exploration / development) are also significant disturbance factors in some areas.

ENVIRONMENT

Environmental Description: Although the geology and topography within the range of this division is highly diverse, much of the region is underlain by bedrock of the Precambrian Shield. West of Saskatchewan, the boreal occurs mostly on the Interior Plains and in the mountainous and high plateau landscapes of the North American Cordillera. In the east, the Gaspé Peninsula and the varied geology of the Maritime Provinces and insular Newfoundland are exceptions to the subdued topography and nutrient-poor lithology of the shield. Regional geologic and topographic features produce an array of local site conditions.

*Climate:* The climate of this division is generally boreal continental. Summers are short; winters long; and there can be a large difference between the coldest and warmest temperatures. Precipitation regimes also vary: the driest areas in the western parts of the range receive as low as 165 mm annually, while the wettest areas in the south and east can receive as much as 1200 mm. Higher elevations and northern regions have cooler temperatures overall. In the cordillera, continental effects are modified where higher elevations and mountainous terrain produce cooler summers, warmer winters and more precipitation than is characteristic of areas in the Interior Plains. The Atlantic boreal has a strong maritime influence, with more moderate temperature extremes and high annual precipitation, including considerable snowfall (up to 400 cm), whereas snowfall westward is typically less than 300 cm and maybe as low as 40-100 cm in the west-central boreal region.

*Soils/substrate:* Almost all of the boreal was glaciated at some time in the Pleistocene (with exceptions in Alaska and parts of Yukon Territory), so glacial till, glaciolacustrine and glaciofluvial materials predominate in landscapes across most of the range of this division. In mountainous areas, colluvial parent materials are also common. Silt caps developed from wind-blown loess are common in the Alaska-Yukon region. Cold soils are common on cool aspects, and humus layers can get fairly thick, especially where fires are infrequent. Permafrost is rare in the southern range of this type but increases in prevalence northward and at higher elevations. In high latitude subarctic woodlands, permafrost-affected terrain is widespread; active (i.e., freeze/thaw) permafrost layers are typically less than a meter deep.

As noted above, much of the boreal is underlain by the Precambrian Shield. Upland soils derived from the igneous and metamorphic rocks of the shield are typically acidic sands and loamy sands. The cordilleran physiographic region has varied geology, consisting of a complex of intrusive igneous and metamorphic rocks (granite, gneiss, schist, phyllite, etc.), some volcanic rock, and flat-lying to gently dipping, sedimentary Paleozoic and Mesozoic rocks. Intrusive igneous rocks of the western cordillera also produce acidic, coarse-textured soils. In contrast, significant areas of the interior and eastern cordillera consist of sedimentary bedrock of Ordovician-Silurian and Middle Devonian carbonates and shales that give rise to basic soils with a loamy texture.

*Biogeography:* There are several gradients impacting variation among forests and woodlands of this division: (1) latitudinal and elevation impacts on temperature regimes; (2) regional floristic elements across the latitudinal range; and (3) regional floristic elements related to the migration of species after Pleistocene glaciation.

Extensive woodlands occur in a northern latitudinal band across North America and are noticeably distinct in physiognomy from the forests to the south. Woodlands also occur in a predictable pattern at higher elevations, particularly in the western cordillera, but also including some high plateaus of western Canada. A west to east precipitation gradient, especially pronounced with Atlantic maritime influences, impacts forest dynamics and composition as discussed [see Floristics]. Additionally, the tree species *Pinus contorta var. latifolia* and *Abies lasiocarpa* replace *Pinus banksiana* and *Abies balsamea* in the cordillera of Alberta, British Columbia, and Yukon and Northwest Territories, but these two species are essentially absent from Alaska.

DISTRIBUTION

\*Geographic Range: This division occurs across northern North America from northern interior Alaska east through Yukon and Northwest Territories, southern Nunavut and northern Manitoba, Ontario and Quebec to Labrador and Newfoundland. Its southern boundary extends from central British Columbia through Alberta and Saskatchewan, southern Manitoba, Ontario and Quebec, and northern New Brunswick and Cape Breton Island, with possible extensions in the upper Great Lakes states of the United States.

Nations: CA, US

States/Provinces: AB, AK, BC, LB, MB, MI?, MN?, NB?, NF, NT, NU, ON, QC, SK, WI?, YT

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M495 | Eastern North American Boreal Forest |
| M496 | West-Central North American Boreal Forest & Woodland |
| M156 | Alaskan-Yukon North American Boreal Forest |
| M179 | North American Northern Boreal Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Alaska-Yukon, West-Central and Eastern floristic subdivisions | Saucier et al. 2015 | Report describes entire Boreal forest. |
| >< | Boreal Forest Region | Rowe 1972 |  |
| > | North American Boreal Zone | Brandt 2009 | Boreal zone also includes non-treed vegetation communities and wetlands. |
| >< | Taiga and Boreal Forest | Elliott-Fisk 2000 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.E. Weaver and F.E. Clements (1929)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Meidinger and K. Baldwin

Acknowledgments [optional]: T. Boucher, J.-P. Saucier, D. Downing, B. Meades

Version Date: 29 Jun 2016

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1. Forest & Woodland

1.B.4.Na. North American Boreal Forest & Woodland

M495. Eastern North American Boreal Forest

Type Concept Sentence: This macrogroup describes upland boreal forests in eastern Canada, ranging from northwestern Ontario to Newfoundland and Labrador. On mesic, well-drained sites with moderate nutrient status, these are primarily closed coniferous forests, although hardwood and mixed conifer-hardwood forests are also common. Dominant tree species include *Abies balsamea, Betula papyrifera, Picea glauca, Picea mariana, Pinus banksiana*, and *Populus tremuloides*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.4.Na. North American Boreal Forest & Woodland (D014)

Elcode: M495

\*Scientific Name: Eastern North American Boreal Forest Macrogroup

\*Common (Translated Scientific) Name: Eastern North American Boreal Forest Macrogroup

\*Colloquial Name: Eastern North American Boreal Forest

\*Type Concept: This macrogroup describes upland boreal forests in eastern Canada, ranging from northwestern Ontario to Newfoundland and Labrador. On mesic, well-drained sites with moderate nutrient status, these are primarily closed coniferous forests, although hardwood and mixed conifer-hardwood forests are also common. Dominant tree species include *Abies balsamea, Betula papyrifera, Picea glauca, Picea mariana, Pinus banksiana*, and *Populus tremuloides*. Two CNVC sub-macrogroups distinguish "Atlantic" boreal forests from those more characteristic of Ontario and western Quebec. On nutrient-poor sites, understory species are dominated by the ericaceous species *Kalmia angustifolia, Ledum groenlandicum, Vaccinium angustifolium*, and *Vaccinium myrtilloides*. On richer sites, forb species such as *Clintonia borealis, Aralia nudicaulis, Trientalis borealis*, and shrubs such as *Acer spicatum* and *Sorbus* spp. are common. Feathermoss cover is dominated by *Pleurozium schreberi*, although *Hylocomium splendens* becomes more prevalent on moister, richer sites. This macrogroup occurs within the humid to perhumid boreal climate of eastern Canada. In the "Ontario and Quebec" boreal, the humid continental climate supports an active fire regime, which results in frequent, and often extensive, post-fire stands of *Pinus banksiana*, usually in combination with *Picea mariana*. *Populus tremuloides* is also important in this sub-macrogroup. The "Atlantic" sub-macrogroup is characterized by dominance of *Picea mariana, Abies balsamea*, and white birch, at the expense of *Pinus banksiana* and *Populus tremuloides*. In the perhumid to oceanic climates of eastern Quebec and Newfoundland and Labrador, fire frequency is reduced and stand dynamics are largely driven by insect epidemics, especially spruce budworm (*Choristoneura fumiferana*) which primarily attacks *Abies balsamea*. Picea mariana is maintained in combination with fir on the landscape by regular, but less frequent, stand-replacing fire. *Hylocomium splendens* becomes more important in the moss layer in the "Atlantic" boreal and the humidity-loving hepatic *Bazzania trilobata* appears. Regional geologic and topographic features produce an array of local site conditions. Most of the area occupied by this macrogroup is underlain by Canadian Shield bedrock, although high elevations of the Gaspé Peninsula and the varied geology of insular Newfoundland are exceptions. Soils are typically Brunisols or podzols developed in glacial sediments.

\*Diagnostic Characteristics:

\*Classification Comments: This type concept is being developed by the CNVC Technical Committee, and further development of the description will await the completion of their work.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M159 | Laurentian-Acadian Pine - Hardwood Forest & Woodland |  |
| M014 | Laurentian-Acadian Mesic Hardwood - Conifer Forest |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Fire, insects, logging and permafrost contribute to successional processes and vegetation patterns. According to Kurz and Apps (1996), 48% of the boreal forest in Canada was disturbed by fire, 39% was disturbed by insects (mainly spruce budworm in the east) and 10% by logging.

Fire is a primary disturbance factor in this region. Current mean fire intervals (i.e. the average period at which a forest burned) are estimated at about 100 years for boreal forests in western Canada (Johnstone et al. 2010, Bergeron and Fenton 2012). Based on the mean fire-return interval, old-growth forests might be expected to be relatively uncommon, but Bergeron and Fenton (2012) used a variety of sources and modeling to estimate the percent of old growth across the Canadian boreal and subarctic woodland ecozones. They found that in the Eastern Boreal Forest ecozones stands >200 years occupied 20-25% of the landscape, and stands >300 years, some 10-15% of the landscape. This is because fires largely act independent of stand age, so some stands are burned twice within a fire cycle, and others are never burned. In addition, fires do not cause complete mortality; with median estimates for live trees per hectare varying from 0 to 241 trees/ha (Perera et al. 2009, as cited in Bergeron and Fenton 2012).

By some estimates, insects and other nonfire disturbances affect a larger area than fire each year (Sutton and Tardif 2009). Among insects, spruce budworm (*Choristoneura fumiferana*) has the largest impact. Outbreak severity (defined as tree mortality) increases with long fire intervals that allow for the establishment or development of more vulnerable host trees in the stands (Bergeron and Fenton 2012). Other insect pests on conifers include larch sawfly (*Pristiphora erichsonii*), larch budmoth (*Zeiraphera diniana*) and two-year budworm (*Choristoneura biennis*), and jack pine budworm (*Choristoneura pinus pinus*). Broadleaf species are affected by defoliators, such as forest tent caterpillar (*Malacosoma disstria*), gypsy moth (*Lymantria dispar*), the large aspen tortix (*Choristoneura conflictana*). Although these insects rarely kill the tree outright, repeated outbreaks can weaken the trees.

Although spruce budworm occurs in all provinces throughout Canada, it is the most severe defoliator in Ontario, Québec, and New Brunswick. In eastern Canada, spruce budworm outbreaks are often more important than fire in terms of tree mortality. Outbreaks occur every 25 to 40 years at the supra-regional scale during the 19th and 20th centuries (Morin et al. 2009). The budworm typically kills its host. White spruce and balsam fir are the principal hosts, with black spruce and red spruce less affected. Mature stands of balsam fir are the most vulnerable. Almost all natural balsam fir (*Abies balsamea*) stands found within certain zones originate from spruce budworm outbreaks, following a cyclical pattern to which balsam is adapted. The budworm cycle may be affected by changes to the fire cycle. A decrease in fire frequency could lead to an increase in budworm effects.

Wind is another important non-fire disturbance, mainly found in coastal or sub-boreal areas where hurricanes generate very strong winds and in continental areas. Return intervals in the sub-boreal region may be quite long, from 450 to 500 years for stand-replacing windthrow events but partial windthrow may be relatively frequent even in interior boreal forests (Bergeron and Fenton 2012).

Finally, fine-scale local level disturbances such as root rot, partial windthrow, and insect mortality, as well as tree senescence, are also observed. In such circumstances, the canopy gaps created are small, corresponding to the growing space of single to multiple canopy trees (Bergeron and Fenton 2012).

ENVIRONMENT

Environmental Description: These boreal forests are most common found on Podzols (Canadian system, Spodosols in U.S. system). These soils are a result of podsolization, which is a consequence of low temperatures and excess precipitation above that expended on evapotranspiration. In this process, iron and aluminum and organic materials are leached out of the upper horizon and deposited in the lower horizon. Nutrients are also leached out, resulting in low bases such as calcium. With low temperatures, soil microorganisms are unable to decompose organic matter effectively, resulting in acidic soils and low nitrogen and mineral levels. Soil conditions and permafrost development can inhibit tree growth. Other soil types include immature Regosols (Entisols), wetland Fibrisols (Histosols), and gray-wooded and grey-brown podsols (Elliott-Fisk 2000).

Permafrost is not abundant, only sporadic, in the closed-crown boreal forest of the East, except for higher elevations (>800 m or more). It becomes more abundant in the subarctic woodlands, where there is discontinuous permafrost around latitude 54 to 56. (J.-P. Saucier pers. comm. 2014).

DISTRIBUTION

\*Geographic Range:

Nations: CA, US

States/Provinces: MI?, MN?, NB?, ON, QC, WI?

USFS Ecoregions (2007) [optional]: 212La:???, 212Lb:???, 212Lc:???

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G824 | Atlantic Boreal Dry Black Spruce Woodland |
| G825 | Atlantic Boreal Mesic-Moist Black Spruce - Balsam Fir Forest |
| G826 | Atlantic Boreal Mesic Balsam Fir - Paper Birch Forest |
| G674 | Atlantic Boreal Moist Balsam Fir - White Spruce Forest |
| G636 | Ontario-Québec Boreal Dry-Mesic Black Spruce - Jack Pine Forest |
| G637 | Ontario-Québec Boreal Mesic-Moist Black Spruce Forest |
| G638 | Ontario-Québec Boreal Mesic Balsam Fir - Hardwood Forest |
| G831 | Ontario-Québec Boreal Moist Black Spruce - Balsam Fir - Hardwood Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-03-30 | M037 Eastern & Central North American Boreal Conifer & Hardwood Forest Macrogroup | M037 split into 2 new types: M495 & M496 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Balsam Fir: 5 | Eyre 1980 |  |
| >< | Black Spruce: 12 | Eyre 1980 |  |
| > | Boreal Forest | Curtis 1959 | Some of Curtis's concept may fit with this type, but he also included stands further inland in Wisconsin, that appear to contain a large abundance of northern hardwoods. |
| < | Fir-Birch | Heinselman 1996 |  |
| < | Jack Pine - Black Spruce | Heinselman 1973 |  |
| < | Jack Pine - Fir, Black Spruce - Feathermoss | Heinselman 1973 |  |
| >< | Jack Pine: 1 | Eyre 1980 |  |
| ? | Perhumid Boreal Forests of Eastern Canada | Clayden et al. 2011 |  |
| < | White Spruce: 201 | Eyre 1980 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: K. Baldwin and Canadian NVC Committee (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K. Baldwin and Canadian NVC Committee (2014) and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 09 Jan 2015

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1. Forest & Woodland

1.B.4.Na. North American Boreal Forest & Woodland

M496. West-Central North American Boreal Forest & Woodland

Type Concept Sentence: This type includes upland boreal and foothill forests in west-central Canada, ranging from northeastern British Columbia to northwestern Ontario. Dominant tree species include *Populus tremuloides, Picea glauca, Picea mariana, Pinus banksiana, Pinus contorta var. latifolia*, and *Betula papyrifera*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.4.Na. North American Boreal Forest & Woodland (D014)

Elcode: M496

\*Scientific Name: West-Central North American Boreal Forest & Woodland Macrogroup

\*Common (Translated Scientific) Name: West-Central North American Boreal Forest & Woodland Macrogroup

\*Colloquial Name: West-Central North American Boreal Forest & Woodland

\*Type Concept: This macrogroup describes upland boreal and Rocky Mountain foothill forests and woodlands in west-central Canada, ranging from southern Yukon and Northwest Territories to northwestern Ontario. Forest canopies can be coniferous, broad-leaved cold-deciduous or a conifer - broad-leaved mixture. These forests are maintained on the landscape by stand-replacing fire, with most parts of the range experiencing short (<100 years) to intermediate (100-270 years) regional fire cycles. Dominant tree species include *Populus tremuloides, Picea glauca, Picea mariana, Pinus banksiana, Pinus contorta var. latifolia*, and *Pinus banksiana*. *Populus balsamifera* occurs on nutrient-rich, usually moist sites. *Betula papyrifera* is an early-seral species that becomes more common eastward in the range. At higher elevations or in fire-sheltered locations, *Abies lasiocarpa* or *Abies balsamea* co-occur with white spruce in late-seral stands. Understories range from dense, species-rich shrub and herb conditions to sparse and open, with continuous feathermoss and/or lichen ground cover. Common understory species include *Calamagrostis canadensis, Chamerion angustifolium, Hylocomium splendens, Ledum groenlandicum, Leymus innovatus, Mertensia paniculata, Pleurozium schreberi, Rosa acicularis, Vaccinium vitis-idaea*, and *Viburnum edule*. Three subtypes distinguish Central boreal forests (Central Boreal Forest (M496a)), Cordilleran low elevation boreal and foothills forests (Cordilleran Boreal Forest (M496b)) and higher elevation Cordilleran boreal woodlands (Cordilleran Boreal Woodland (M496c)).

The area occupied by this macrogroup is characterized by a subhumid continental boreal climate, with long, cold winters and short, mild summers. Continental effects are modified in the Cordilleran portion of the range (M496b and M496c), where higher elevations and mountain influences mitigate temperature extremes and generate greater precipitation than in the northern and eastern parts of the range. Mean annual temperature varies from about -5°C at the northern limit in the Northwest Territories to about +2°C in the southern Alberta foothills. Annual precipitation varies between approximately 300 and 750 mm across the geographic range of the macrogroup, depending on latitude, longitude and elevation. Elevations are generally <500 mASL in the eastern portion of the range (i.e., northwestern Ontario to central Saskatchewan), rising gradually westward to approximately 800 mASL in northwestern Alberta, then extending to the lower boundary of the Cordilleran subalpine zone in western Alberta and central British Columbia (approximately 1400 mASL), and to treeline in Yukon, Northwest Territories and northern British Columbia (1000-1500 mASL). Regional geologic and topographic features of the Cordilleran, Interior Plains and western Precambrian Shield physiographic regions produce an array of local site conditions. Essentially, all parts of the range experienced Pleistocene glaciation; soils are mostly Brunisols and Luvisols developed in surficial glacial materials.

\*Diagnostic Characteristics:

\*Classification Comments: This macrogroup describes the upland boreal forests of west-central Canada (excluding southwestern Yukon), including the high-elevation woodlands of the western Cordillera. These forests are characterized by general dominance of *Populus tremuloides, Picea glauca*, and *Pinus contorta var. latifolia* or *Pinus banksiana* on circum-mesic sites, although *Abies lasiocarpa* is important in higher elevation woodlands. Boreal upland forests in eastern Canada, described by ~Eastern North American Boreal Forest Macrogroup (M495)$$, are distinguished from those of this macrogroup (M496) by general dominance of *Abies balsamea, Picea mariana*, and *Betula papyrifera* on circum-mesic sites. Understories also differ in dominant species, including ericaceous shrubs and feathermosses. To the northwest of the range of this macrogroup, ~Alaskan-Yukon North American Boreal Forest Macrogroup (M156)$$ is distinguished by the general absence of *Betula papyrifera, Abies lasiocarpa*, and *Pinus contorta var. latifolia* in the tree layer, and by increased prominence of a suite of arctic-northern understory species (in conjunction with reduced presence of southern Cordilleran species). North of the range of this macrogroup, ~North American Boreal Subarctic & Subalpine Woodland Macrogroup (M179)$$ describes subarctic upland treed communities dominated by *Picea glauca* and *Picea mariana* and exhibiting woodland physiognomy, typically with ground cover of lichens rather than feathermosses. M496 does not include *Picea engelmannii - Abies lasiocarpa* forests in the Cordilleran region of western Canada; these forests are described by ~Rocky Mountain Subalpine-High Montane Conifer Forest Macrogroup (M020)$$. In central British Columbia, low-elevation subboreal forests (~Rocky Mountain Intermontane Subboreal Forest Macrogroup (M890)$$) occur in areas influenced by a more moderate climate than that of M496. Stands are more productive, reflecting the warmer and moister climate. Hybrid *Picea x albertiana* [*engelmannii x glauca*] replaces *Picea glauca* on circum-mesic sites in M890 forests. Understory shrubs such as *Vaccinium membranaceum, Rubus parviflorus*, and *Lonicera involucrata*, together with various herb species (especially ferns), are more prominent than in the adjacent boreal forests of M496.

Within subtypes Central Boreal Forest (M496a) and (Cordilleran Boreal Forest (M496b), CNVC groups break out forests using diagnostic species indicators of site-scale moisture and nutrient conditions. In M496a, three groups are recognized by the CNVC: Central Boreal Dry Jack Pine Forest (CG0009), Central Boreal Mesic-Moist Black Spruce - Jack Pine Forest (CG0010), and Central Boreal Mesic-Moist Trembling Aspen - White Spruce Forest (CG0011). In M496b, four groups are recognized by the CNVC: Cordilleran Boreal Dry Lodgepole Pine Forest (CG0012), Cordilleran Boreal Mesic-Moist Black Spruce - Lodgepole Pine Forest (CG0013), Cordilleran Boreal Mesic Trembling Aspen - White Spruce Forest (CG0014), and Cordilleran Boreal Moist White Spruce - Trembling Aspen (Balsam Poplar) Forest (CG0015). CNVC groups have not yet been characterized in subtype Cordilleran Boreal Woodland (M496c).

*Abies lasiocarpa* here refers to both *Abies lasiocarpa* and *Abies bifolia*, as recognized by VASCAN (Brouillet et al. 2010).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M156 | Alaskan-Yukon North American Boreal Forest |  |
| M179 | North American Northern Boreal Woodland |  |
| M300 | North American Boreal Flooded & Rich Swamp Forest |  |
| M299 | North American Boreal Conifer Poor Swamp |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup includes mainly upland forests, although woodlands can occur on very dry sites and at the climatic limits of closed forest (higher elevations and latitudes). Boreal riparian and wetland forests and woodlands within the range of this macrogroup are described by ~North American Boreal Conifer Poor Swamp Macrogroup (M299)$$ and ~North American Boreal Flooded & Rich Swamp Forest Macrogroup (M300)$$. Physiognomically, forest canopies can be coniferous, broad-leaved cold-deciduous ("hardwood") or a conifer-hardwood mixture, depending on regional climate, local site conditions, seed/propagule availability at time of establishment and disturbance history. Seven tree species, of two evergreen coniferous (*Picea, Pinus*) and two cold-deciduous hardwood (*Betula, Populus*) genera, dominate overstory cover. Understory structure ranges from dense to sparse shrub and herb/dwarf-shrub layers, usually with ericaceous species and regenerating conifers present. The moss layer is typically well-developed, especially under conifer canopies. These forests are subject to regular stand replacement by wildfire and seldom reach ages >150 years; stands are often even-aged. Most species exhibit one or more adaptation traits to disturbance, in some cases specific to fire. Post-disturbance stand structure is usually simple but two-storied structure can develop over time in the absence of fire.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The main tree species are *Populus tremuloides, Picea glauca, Picea mariana, Pinus contorta var. latifolia*, and *Pinus banksiana*. *Populus tremuloides* and the *Picea* species occur throughout the full range of the macrogroup. The *Pinus* species are segregated between the Cordilleran and Central subtypes, with *Pinus contorta var. latifolia* characteristic of Cordilleran Boreal Forest (M496b) and lower elevations of Cordilleran Boreal Woodland (M496c), and *Pinus banksiana* occurring in Central Boreal Forest (M496a). Other important tree species include *Populus balsamifera* on nutrient-rich, generally moist sites throughout the range and *Betula papyrifera*, which increases in frequency eastward in M496a (*Betula neoalaskana* replaces *Betula papyrifera* in Yukon). *Abies lasiocarpa* [see Comments section], in M496b and M496c, and *Abies balsamea*, in M496a, are shade-tolerant, late-seral species that can grow into the main canopy of M496 forests and woodlands after approximately 120 years but are usually uncommon in this macrogroup because fire cycles are generally too short to allow their persistence on the landscape. However, at higher elevations where fires are less common, *Abies lasiocarpa* is an important component of the open stands constituting M496c. *Larix laricina* occurs occasionally in these upland forests. Tree species are distributed on the landscape in response to both environmental and historic factors. Site moisture and nutrient status, together with fire frequency, are important determinants of stand composition. All of the major tree species, except *Abies* spp., are adapted to regenerate following stand-replacing fire, forming both pure and mixed stands.

In subtypes M496b and M496c, *Pinus contorta var. latifolia* often forms extensive even-aged stands following fire. On dry to moist, nutrient-poor sites in M496b, it often occurs with an understory of *Picea mariana* that seeds into the stand at the same time as *Pinus contorta var. latifolia* but grows more slowly. In subtype M496a, ecologically similar *Pinus banksiana* substitutes for *Pinus contorta var. latifolia*. It also forms extensive even-aged stands following fire, often in association with *Picea mariana*, but mainly on dry, nutrient-poor sites associated with sandy soils and shallow bedrock on the Precambrian Shield. Where the ranges of *Pinus contorta var. latifolia* and *Pinus banksiana* overlap in north-central Alberta, the two species hybridize (*Pinus x murraybanksiana*). On dry to moist, nutrient-poor sites throughout the range of M496a and M496b, *Picea mariana* occurs as a leading, codominant or subdominant species, often in association with one of the *Pinus* species. Where it is dominant, *Picea mariana* can form either even-aged or uneven-aged stands, depending on site characteristics and stand history (usually time since the last fire).

On mesic to moist sites with medium nutrient status, especially at lower elevations (i.e., approximately <800 mASL) in subtypes M496a and M496b, *Populus tremuloides* is the main fire-successional tree species, often in association with *Picea glauca*, which seeds in under the initial *Populus tremuloides* overstory. In M496b, *Pinus contorta var. latifolia* competes with *Populus tremuloides* on these sites, resulting in early-seral mixed *Pinus contorta var. latifolia - Populus tremuloides* stands in addition to pure *Populus tremuloides* stands. In these cases, *Picea glauca* can establish immediately following fire or other disturbance that exposes mineral seedbeds if there is an adequate seed supply. Throughout the range, *Picea glauca* also seeds into existing stands of *Pinus contorta var. latifolia, Pinus banksiana, Populus tremuloides, Picea mariana*, and *Betula* spp., persisting in the understory due to its shade tolerance and eventually growing into the main canopy where, in the absence of fire for extended periods (approximately >100 years), it dominates uneven-aged stands with variable species mixes. In fire-sheltered locations (most common in M496c), *Abies* spp. (*Abies lasiocarpa* in M496b and M496c; *Abies balsamea* in M496a) co-occur with *Picea glauca* in these late-seral stands. On moist sites with richer nutrient status, *Picea glauca* often forms mixed stands with *Picea mariana* and/or *Populus balsamifera*. In the southern Cordillera, *Picea glauca* hybridizes with *Picea engelmannii (= Picea x albertiana)* at elevations above approximately 1000 mASL. In subtype M496c, scrubby stands of *Populus tremuloides* or sometimes *Populus balsamifera* can occur on steep, warm-aspect slopes following fire, and can persist, especially where *Picea glauca* or *Abies lasiocarpa* lack a nearby seed source.

On moist, nutrient-rich sites at lower elevations throughout the range of M496, such as seepage slopes and stable river terraces, *Populus balsamifera* is found in mixed stands with *Populus tremuloides* and coniferous species. Although they occur on a wide range of site moisture and nutrient conditions, in pure or mixed stands, *Betula papyrifera* and *Betula neoalaskana* are also abundant on moist, nutrient-rich sites often associated with riparian areas. In the southeastern part of the M496a range, *Acer negundo* and *Fraxinus pennsylvanica* occur on seepage slopes and riparian sites. Boreal riparian forests within the range of M496 are described by ~North American Boreal Flooded & Rich Swamp Forest Macrogroup (M300)$$. The understories of M496 forests include widely distributed boreal species as well as species more characteristic of northwestern North America. Many species are associated with a specific range of site moisture and nutrient conditions and are used as diagnostic indicators at group, alliance and association levels of the CNVC hierarchy within M496.

The broad-leaved shrub *Rosa acicularis*, the herb/dwarf-shrub species *Cornus canadensis, Chamerion angustifolium*, and *Linnaea borealis*, and the feathermosses *Pleurozium schreberi* and *Hylocomium splendens* are ubiquitous, occurring with low to high abundance on a broad spectrum of site conditions. The ericaceous species *Ledum groenlandicum (= Rhododendron groenlandicum)* and *Vaccinium vitis-idaea* occur with high frequency and cover on nutrient-poor sites. *Arctostaphylos uva-ursi* and ground lichens are dominant on dry sites, typically under open canopies. *Rubus pubescens* and *Mertensia paniculata* are indicators of moist, nutrient-rich sites.

Plant species composition and relative importance change from west to east across the range of M496 and, in the Cordillera, from low to high elevations. Species such as *Viburnum edule, Lonicera involucrata, Shepherdia canadensis, Chamerion angustifolium, Leymus innovatus* and *Calamagrostis canadensis* are more common and abundant in subtype M496b. These species are missing or occur with much lower frequency and abundance in subtype M496a, while eastern species such as *Clintonia borealis, Acer spicatum, Gaultheria hispidula*, and *Eurybia macrophylla* are increasingly found in the eastern portion of the range. On nutrient-poor sites, *Vaccinium myrtilloides* is both common and abundant in M496a. *Equisetum* spp.-dominated understories on moist, nutrient-rich sites are characteristic of subtype M496b but absent or very rare in M496a. Except on nutrient-poor sites, feathermoss dominance changes from *Pleurozium schreberi* in M496a to *Hylocomium splendens* in M496b. Likewise, with increasing elevation in the Cordillera, the characteristic species of M496b become less frequent and species such as *Betula nana, Salix glauca, Empetrum nigrum*, and *Vaccinium uliginosum* become important in the open woodland physiognomy of subtype M496c.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Fire, insects, logging and permafrost contribute to successional processes and vegetation patterns. According to Kurz and Apps (1996), 48% of the boreal forest in Canada was disturbed by fire, 39% was disturbed by insects (mainly spruce budworm in the east) and 10% by logging.

Fire is a primary disturbance factor in this region. Current mean fire intervals (i.e., the average period at which a forest burned) are estimated at about 100 years for boreal forests in western Canada (Johnstone et al. 2010, Bergeron and Fenton 2012). Based on the mean fire-return interval, old-growth forests might be expected to be relatively uncommon, but Bergeron and Fenton (2012), using a variety of sources and modeling to estimate the percent of old growth across the Canadian boreal and subarctic woodland ecozones, found that in the Central Boreal Forest ecozones stands >200 years occupied 5-10% of the landscape [see also Johnson et al. (1995)] and stands >300 years are <5%. This is because fires largely act independent of stand age, so some stands are burned twice within a fire cycle, and others are never burned. In addition, fires do not cause complete mortality; with median estimates for live trees per hectare varying from 0 to 241 trees/ha (Perera et al. 2009, as cited in Bergeron and Fenton 2012).

By some estimates, insects and other non-fire disturbances affect a larger area than fire each year (Sutton and Tardif 2009). Among insects, spruce budworm (*Choristoneura fumiferana*) in the east and mountain pine beetle (*Dendroctonus ponderosae*) have the largest impact. In both cases, outbreak severity (defined as tree mortality) increases with long fire intervals that allow for the establishment or development of more vulnerable host trees in the stands (Bergeron and Fenton 2012). Other insect pests on conifers include larch sawfly (*Pristiphora erichsonii*), larch budmoth (*Zeiraphera diniana*), two-year budworm (*Choristoneura biennis*), and jack pine budworm (*Choristoneura pinus pinus*). Broadleaf species are affected by forest tent caterpillar (*Malacosoma disstria*), gypsy moth (*Lymantria dispar*), and the large aspen tortix (*Choristoneura conflictana*).

Wind is another important non-fire disturbance. Return intervals in the sub-boreal region may be quite long, from 450 to 10,500 years for stand-replacing windthrow events, but partial windthrow may be relatively frequent even in interior boreal forests (Bergeron and Fenton 2012). Fine-scale local level disturbances such as root rot, partial windthrow, and insect mortality, as well as tree senescence, are also observed. In such circumstances, the canopy gaps created are small, corresponding to the growing space of single to multiple canopy trees (Bergeron and Fenton 2012).

Environmental site characteristics, plant species autecology and seed/propagule availability, and disturbance history (i.e., type, severity and frequency) influence secondary succession trends within the forests of M496. Stand-replacing fires, usually caused by lightning strikes, are the most widespread form of disturbance; regional fire cycles are generally short (<100 years) to intermediate (100-270 years), although they can be longer at higher elevations in the Cordillera. Fires vary considerably in size, with large fires possible in any part of the range despite modern fire suppression practices. Burn severity is variable within each fire, so a spatial mosaic of burned and residual patches is typical on the post-fire landscape. At broader scales, especially for subtypes Central Boreal Forest (M496a) and Cordilleran Boreal Forest (M496b), early- to mid-seral (0-120 years approximately) stands are prevalent on the landscape while old-seral stands (greater than about 120 years of age) generally cover less than 30% of the landscape. The higher elevation woodlands of subtype Cordilleran Boreal Woodland (M496c) burn less frequently and have a greater proportion of old-seral stands. Agricultural clearing, forest harvesting and other industrial activities (chiefly mineral and petroleum exploration and development) are also significant disturbance factors in some areas. Site moisture and nutrient status are important determinants of secondary succession. On moist, nutrient-rich sites, intense competition from shrubs and herbs immediately following fire, harvesting or land clearing controls the availability of microsites suitable for the germination and growth of conifers; root or stump-regenerating deciduous species, such as *Populus* spp. and *Betula papyrifera*, are less affected by competition. On mesic to dry sites, post-burn conditions are usually suitable for seed germination and growth of *Pinus* spp. and *Picea* spp. *Populus tremuloides* is the most widespread early-seral species on circum-mesic sites at lower elevations, attaining very high stem densities and self-thinning over several decades. If seed sources are available, *Picea glauca* and *Abies balsamea* (M496a) or *Abies lasiocarpa* (M496band M496c) subsequently seed in from adjacent unburned areas during the mid- to late seral stages and, over time (usually more than 120 years), can grow into the main canopy and eventually become dominant as the early-seral species decline. In the longer fire cycle of M496c woodlands, *Picea glauca* and *Abies lasiocarpa* are the main tree species. Throughout the range of M496, *Pinus* spp. are normally the most successful early-seral species on very dry sites. At elevations above approximately 800 mASL in M496b (but below approximately 1200 mASL in M496c), *Pinus contorta var. latifolia* dominates early-seral stands on all sites.

These forests and woodlands are subject to a variety of diseases and insects that typically cause mortality to individual or small groups of trees but are capable of creating changes in tree species dominance at the stand and landscape level. Tomentosus root disease (*Inonotus tomentosus*) and Armillaria root rot (*Armillaria* spp.) are widespread in spruce and pine forests of M496, causing mortality of young trees and increasing susceptibility of older trees to windthrow and insect attack. Insects, such as eastern spruce budworm (*Choristoneura fumiferana*), jack pine budworm (*Choristoneura pinus pinus*), and forest tent caterpillar (*Malacosoma disstria*), are endemic to these forests and can cause defoliation and possible mortality of (primarily) *Picea glauca, Pinus banksiana*, and *Populus tremuloides*, respectively, in periodic population outbreaks.

In recent years, mountain pine beetle (*Dendroctonus ponderosae*) has caused significant economic and ecological impacts to *Pinus contorta var. latifolia* forests in sub-boreal British Columbia. Within its historic range in interior BC, beetle cycles occur every 20-40 years. At low population densities, the insect preferentially attacks and kills older, less vigorous trees, opening canopy gaps. At epidemic levels, however, mass attacks can extend over large areas and overwhelm the defenses of vigorously growing immature pines. Recently the beetle has spread northward and eastward into boreal *Pinus contorta var. latifolia* forests, affecting even hybrid *Pinus x murraybanksiana* and *Pinus banksiana* stands in northern Alberta. Climate change and forest management practices, including fire suppression, have likely contributed to these unprecedented beetle densities as well as to the expansion of its range and host species. Since the mountain pine beetle is novel to boreal ecosystems, long-term effects on these forests are uncertain.

ENVIRONMENT

Environmental Description: *Climate*: This macrogroup develops within the subhumid continental boreal climate of west-central Canada, characterized by long, cold winters and short, cool to moderately warm summers. Continental effects are moderated in the Cordilleran portion of the range, including the Rocky Mountain foothills of Alberta and the boreal region of northern British Columbia, where higher elevations and orographic effects produce cooler summers, warmer winters and more precipitation than is characteristic of areas to the north and east.

Mean annual temperatures vary from -3°C to -5°C along the northern edge of the range to greater than +2°C in the southern Alberta foothills. The growing season is short, averaging less than 1000 growing degree days above 5°C (GDD), although southern portions of the range can reach 1600 GDD. In the Cordilleran areas of Yukon, Northwest Territories, British Columbia and Alberta, mean annual precipitation varies from 300 to 750 mm (approximately), depending upon latitude, longitude and elevation (>1000 mm at some higher elevations in northwestern BC). East of the foothills, mean annual precipitation generally increases eastward, reaching approximately 750 mm at the eastern limit of the range in northwestern Ontario. In all parts of the range, over half of the annual precipitation falls as rain, often during summer thunderstorms. Drought is a regular occurrence, especially for subtypes Central Boreal Forest (M496a) and Cordilleran Boreal Forest (M496b), affecting productivity of these forests and exacerbating disturbance by fire, insects and disease.

*Physiography, Geology, Topography and Soils*: M496 occupies portions of the Cordilleran and Interior Plains physiographic regions of western Canada, as well as portions of the Kazan, Hudson and James regions of the western Precambrian Shield. In the Cordilleran region, subtypes Cordilleran Boreal Forest (M496b) and Cordilleran Boreal Woodland (M496c) describe the upland forests and woodlands below approximately 1500 mASL in the Selwyn, Wernecke, Pelly, Omineca, Cassiar and northern Rocky mountains of Yukon and British Columbia, as well as on the Stikine and Yukon plateaus of northwestern BC and central Yukon, and the Liard Plain and Liard and Hyland plateaus of northeastern BC, southeastern Yukon and southwestern Northwest Territories. Upland forests of the Rocky Mountain Foothills below the lower subalpine limit are also included in M496b north of the Bow River in Alberta. In the Interior Plains region, M496 forests cover the Alberta Plateau and associated Fort Nelson and Peace River Lowlands, as well as the forested portions of the Alberta, Saskatchewan and Manitoba Plains. On the Precambrian Shield, subtype Central Boreal Forest (M496a) describes all upland forests of the Athabasca Plain and the southern Kazan Uplands of northern Alberta, Saskatchewan and Manitoba, as well as the Severn Uplands and Hudson Bay Lowland of eastern Manitoba and northwestern Ontario.

Geology and topography within the range of M496 is highly diverse. In the Cordilleran physiographic region, the terrain is a complex mixture of high mountains (up to 3000 mASL) with intervening plateaus, hill systems, valleys, trenches, basins, etc. The geology of the Cordillera within the range of M496 is mostly faulted and folded Paleozoic, Mesozoic or Tertiary sedimentary, often carbonate, rocks. The Eastern System of the Cordillera (e.g., the Rocky Mountains and associated foothills) underwent little or no metamorphic or volcanic activity. In the Interior System some volcanism and igneous intrusions (e.g., the Omineca Mountains) occurred. In the northwestern part of the range (Yukon and northern BC), forests and woodlands described by subtypes M496b and M496c are found up to elevational treeline (approximately 1000-1200 mASL in Yukon, 1500 mASL in northern BC). In western Alberta, foothill forests of M496b are replaced by subalpine forests (~Rocky Mountain Subalpine-High Montane Conifer Forest Macrogroup (M020)$$) above approximately 1400 mASL, except in some mountain valleys where subalpine forests occur at lower elevations. The Interior Plains physiographic region is underlain by level to gently tilted Paleozoic, Mesozoic or Tertiary sedimentary rocks. The topography is mostly an undulating plain, although there are several low-elevation hill systems. Interior Plains elevations in northern BC and Alberta range from approximately 1000 mASL in the hill systems of northern Alberta to <300 mASL in the Fort Nelson and Peace River Lowlands. Elevations in southern Saskatchewan and Manitoba rarely exceed 800 mASL. On the Precambrian Shield in northern Saskatchewan and Manitoba, as well as in northwestern Ontario, elevations are below 600 mASL. The Kazan and Severn Uplands exhibit characteristic Shield landscapes, with broad expanses of rolling terrain containing numerous wetlands and lakes; local relief rarely exceeds 100 m. The geology comprises Precambrian sedimentary and crystalline rocks. On the Hudson Bay Lowland, Paleozoic carbonate-rich strata overlie the Precambrian rocks creating a flat plain with low relief and extensive wetlands.

With the exception of a small area in southern Yukon, the entire range of M496 was affected by Pleistocene glaciation and surficial landscape expression is dominated by glacial features and bedrock-controlled terrain. In the mountains and foothills of subtypes M496b and M496c, till blankets and veneers overlie bedrock. This variable topography produces significant changes in local site moisture and nutrient status over short distances. In areas with lower relief underlain by gently tilted to level sedimentary rocks (especially in the Interior Plains), thicker till and glaciolacustrine or glaciofluvial deposits provide consistent moisture and nutrient conditions over more extensive areas. In the Shield areas of M496a, till veneers are often shallow over bedrock on upland sites, while deeper deposits of glacial drift fill landscape depressions. Upland mineral soils are typically well to imperfectly drained Brunisols (coarser textures) and Luvisols (finer textures), with Gleysols and some shallow peat veneers in moist, poorly drained locations. Although peatlands dominated by Organic soils are common in poorly drained landscape depressions within the range of M496, vegetation on these sites is primarily described by ~North American Boreal Conifer Poor Swamp Macrogroup (M299)$$ and ~North American Boreal Flooded & Rich Swamp Forest Macrogroup (M300)$$. Neither permafrost nor paludification are regular features of soils associated with the forests of M496, although these processes do occur sporadically at the northern edges of the range on cold, moist sites where mineral soils are overlain by shallow peat.

DISTRIBUTION

\*Geographic Range: This macrogroup includes the upland boreal forests and woodlands of British Columbia, Alberta, Saskatchewan, Manitoba, south-central and eastern Yukon, southern Northwest Territories, and northwestern Ontario north of approximately 51°N and west of approximately 86°W. In Alberta, forests of the Rocky Mountain foothills are also included in this macrogroup.

Nations: CA

States/Provinces: AB, BC, MB, SK

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]: 8788 (Canadian National Vegetation Classification. 2015. CNVC Master Database [VPro13/MSAccess 2010 format]. Natural Resources Canada, Sault Ste. Marie, ON.)

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]: Moderate

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G639 | Central Boreal Dry Jack Pine Forest |
| G640 | Central Boreal Mesic-Moist Black Spruce - Jack Pine Forest |
| G580 | Cordilleran Boreal Dry Lodgepole Pine Forest |
| G836 | Cordilleran Boreal Mesic-Moist Black Spruce - Lodgepole Pine Forest |
| G837 | Cordilleran Boreal Mesic Aspen - White Spruce Forest |
| G838 | Cordilleran Boreal Moist White Spruce - Aspen Forest |
| G641 | Central Boreal Mesic-Moist Aspen - White Spruce Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-03-30 | M037 Eastern & Central North American Boreal Conifer & Hardwood Forest Macrogroup | M037 split into M495 & M496 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: L. Allen, K. Baldwin, S. Basquill, K. Chapman, W. MacKenzie, M. Major, B. Meades, D. Meidinger, C. Morneau, P. Uhlig

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K. Baldwin, D. Downing, D. Meidinger and K. Chapman

Acknowledgments [optional]:

Version Date: 05 Jul 2016

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1.B.5. Boreal Flooded & Swamp Forest

Boreal Flooded & Swamp Forest is a tree-dominated wetland influenced by minerotrophic groundwater (rarely ombrotrophic), either on mineral or organic (peat) soil, found in northern, high latitudes of North America and Eurasia, with extended cold winters and short mild summers.

1. Forest & Woodland

1.B.5.Na. North American Boreal Flooded & Swamp Forest

D016. North American Boreal Flooded & Swamp Forest

Type Concept Sentence: This division includes conifer-treed poor peat swamps and broad-leaved cold-deciduous (hardwood) riparian forests and rich swamps of the boreal region of North America, characterized by *Abies balsamea, Fraxinus nigra, Larix laricina, Picea mariana, Populus balsamifera*, and *Thuja occidentalis*.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 1.B.5.Na. Boreal Flooded & Swamp Forest (F036)

Elcode: D016

\*Scientific Name: *Picea mariana - Larix laricina - Populus balsamifera* Boreal Flooded & Swamp Forest Division

\*Common (Translated Scientific) Name: Black Spruce - Tamarack - Balsam Poplar Boreal Flooded & Swamp Forest Division

\*Colloquial Name: North American Boreal Flooded & Swamp Forest

\*Type Concept: This division is found on moist to wet sites across the boreal region of North America. It encompasses forested peat swamps dominated by the conifers *Larix laricina* or *Picea mariana*, and floodplain forests and swamps dominated by the broad-leaved cold-deciduous tree species *Fraxinus nigra* and *Populus balsamifera*, or the conifers *Abies balsamea* and *Thuja occidentalis*. *Betula papyrifera, Picea glauca, Populus tremuloides*, or *Ulmus americana* may also occur in boreal floodplain forests. Forested peatlands mostly occur on poorly-drained, low-lying landscape positions with shallow to deep organic deposits, and a nutrient status ranging from richly to mildly minerotrophic (intermediate to rich swamps) to somewhat ombrotrophic (poor swamp) conditions. Floodplain forests occur along medium-sized to large rivers, on medium- to coarse-textured mineral soils, and are generally flooded each spring. Ericaceous shrubs and peatmosses (*Sphagnum* spp.) dominate the understory of the more nutrient-poor sites. Richer peatland sites are characterized by shrub birches (*Betula* spp.) and willows (*Salix* spp.), a greater abundance of graminoids (e.g., *Calamagrostis canadensis*) and horsetails (*Equisetum* spp.) and a well-developed moss layer that includes *Hylocomium splendens, Pleurozium schreberi*, brown mosses (e.g., *Aulacomnium palustre, Tomentypnum nitens*), and leafy mosses (Mniaceae). Floodplain forests generally have species-rich understories, including *Alnus incana, Calamagrostis canadensis, Cornus sericea, Matteuccia struthiopteris*, and various *Salix* spp.

\*Diagnostic Characteristics: Strong diagnostic tree species are *Abies balsamea, Betula papyrifera, Larix laricina, Picea glauca, Picea mariana*, and *Populus balsamifera*. *Fraxinus nigra, Thuja occidentalis*, and *Ulmus americana* are moderate diagnostic species that are more prevalent in the temperate region. *Populus tremuloides* is a moderate diagnostic species also found in the eastern cool-temperate region and in the Rocky Mountains. Some understory species with strong to moderate diagnostic value are *Alnus incana* and *Calamagrostis canadensis*.

\*Classification Comments: The concept for this division was developed by the CNVC Technical Committee (Ken Baldwin, chair). The forested poor peat swamps of this division have similar floristics to treed bogs and fens, where the trees are of lower stature. The treed bogs and fens are included with open bogs and fens within 2.C.2.Na ~North American Bog & Fen Division (D029)$$. Bogs and fens of D029 can contain trees up to 5 m tall (and scattered trees >5 m), although they are generally shorter. But height criteria may need to be more flexible, and linked to floristics and ecology, as Harris et al. (1996), MacKenzie and Moran (2004), Banton et al. (2008) and Rydin and Jeglum (2013) all put the height criteria closer to 10 m and 25% cover to distinguish treed bogs and fens from forested poor swamps.

Riparian/floodplain forests of higher "benches" have limited flooding and deeper subsurface waters and are floristically similar to moist upland forests. As such, forests of this type, e.g., riparian forests dominated by *Picea glauca*, are included in the upland 1.B.4.Na ~North American Boreal Forest & Woodland Division (D014)$$.

Subarctic woodlands on upland sites may have similar structure and vascular species composition to treed peatlands of subarctic regions. They differ in the soil conditions and understory dominance of wetland species such as *Rubus chamaemorus, Eriophorum* spp., *Sphagnum* spp., *Tomentypnum nitens*, and/or *Aulacomnium palustre*.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D011 | Eastern North American-Great Plains Flooded & Swamp Forest | occurs to the south of this division and contains similar types of communities dominated by more eastern and central temperate continental species. |
| D195 | Rocky Mountain-Great Basin Montane Flooded & Swamp Forest | occurs to the south of this division and contains similar types of communities dominated by western temperate continental species. |
| D193 | Vancouverian Flooded & Swamp Forest | occurs to the west of the southwestern range of this division and contains similar types of communities dominated by western temperate maritime species. |
| D014 | North American Boreal Forest & Woodland |  |
| D029 | North American Bog & Fen | includes open and treed boreal bogs and fens. When trees occur, they are <5 m tall, or if >5 m, then <10% cover. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This division includes forested peat swamps dominated by needle-leaved evergreen or deciduous conifer tree species, and swamps and riparian forests dominated by broad-leaved cold-deciduous and/or needle- or scale-leaved evergreen tree species, typically greater than 5 m tall. Stand density is highly variable, ranging from closed, moderately productive forests to open stands of poor productivity. Age structure ranges from single-aged, e.g., young riparian stands, to multi-aged. Conifer swamps generally have a well-developed shrub understory and a nearly continuous cover of mosses. Riparian stands usually have a well-developed shrub understory but low to no cover of mosses due to flooding and/or broadleaf litter.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Picea mariana* is the predominant tree species of peatlands of this division. *Larix laricina* can dominate in both nutrient-poor and nutrient-enriched (minerotrophic) peatlands. *Abies balsamea* (eastern range) or *Picea glauca* (western range) may occur on nutrient-rich organic sites. The understory is dominated by ericaceous shrubs, especially on the more nutrient-poor sites. *Ledum groenlandicum (= Rhododendron groenlandicum)* and *Vaccinium vitis-idaea* occur across the range, except in Atlantic Canada where *Kalmia angustifolia* and *Rhododendron canadense* replace *Ledum groenlandicum*. On richer sites, *Alnus incana, Betula glandulosa*, or *Salix* spp. are prevalent, as are graminoids, and, in the west, *Equisetum* spp. is prevalent. *Sphagnum* spp. characterize the ground layer of these peatland forests and woodlands although feathermosses (*Hylocomium splendens, Pleurozium schreberi*) are also present. On peatlands with higher nutrient status, *Aulacomnium palustre* and *Tomentypnum nitens* are common.

Throughout the range, *Populus balsamifera* is a dominant tree species in floodplain and richer swamp forests. In eastern Canada, *Fraxinus nigra, Abies balsamea*, or *Thuja occidentalis* are also dominant or codominant species. In various parts of the range, *Betula papyrifera, Picea glauca, Populus tremuloides, Acer negundo*, or *Ulmus americana* may also occur in boreal floodplain forests. Common understory species include *Alnus incana, Calamagrostis canadensis, Cornus sericea (= Cornus stolonifera), Equisetum arvense, Equisetum palustre, Equisetum pratense, Matteuccia struthiopteris*, and *Salix* spp. The understory can be highly species-rich and diverse in the shrub and herb layers; mosses are generally of low cover due to frequent flooding and volume of broadleaf litter.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Boreal flooded and swamp forests are generally stable ecosystems that are maintained by persistently high water tables. Local hydrology is the main ecological determinant of vegetation characteristics, and changes in water chemistry or level of the permanent water table affect nutrient status, degree of aeration, and soil temperature in the rooting zone. Hydrological changes are usually the result of alterations in local drainage patterns by natural (e.g., beaver activity) or anthropogenic (e.g., road-building, ditching) modifications. Paludification can also occur with higher water tables in cold or wet climates, resulting in the expansion of peatlands onto adjacent upland sites. Although fires can occur on peatlands, they are infrequent because these sites are so wet.

Riparian forests are subject to regular flooding. Erosional dynamics of rivers, including cutting of banks and upstream benches, and downstream deposition of sediments alter growing site conditions by affecting the stability of rooting zones and changing the depth of subsurface seepage. The riparian communities of this division are primarily "mid-bench," i.e., they occur on intermediate height floodplain sites that experience flooding most years, with some deposition of sediment. The "mid" benches are generally characterized by broad-leaved cold-deciduous or mixed broad-leaved and conifer stands, where conifers will replace the broad-leaved tree species over time as the height of the floodplain rises and the conifers outlive the broad-leaved trees. Fires are not common in these communities as they are usually dominated by broad-leaved deciduous trees on relatively moist sites.

ENVIRONMENT

Environmental Description: Forested poor swamps occur in poorly drained areas with persistently high water tables and limited waterflow. Under such nutrient-poor conditions in the cold boreal climate, growth rates of *Sphagnum* mosses and some graminoids exceed rates of decomposition and peatlands develop with the accumulation of organic materials. Permafrost is a factor in subarctic and some northern boreal peatlands, and in the high subarctic classic permafrost features such as palsa and plateau bogs and ice-wedge polygons develop. Forested poor swamps have at least some minerotrophic influence and slightly better drainage than lower-statured treed bogs and fens. But it may be very difficult to observe differences in vegetation response between poor swamps and treed bogs or poor fens.

Riparian forests occur along watercourses, adjacent to medium and large rivers where annual flooding takes place and a subsurface water table or seepage supplies nutrient-rich water to the mineral substrate of the site. Boreal swamps occur on floodplains or in landscape depressions where poor drainage maintains high water tables but there is subsurface water movement that provides nutrients and oxygen to the rooting zone.

*Climate:* This division occurs in a boreal climate. Summers are short; winters long; and there can be a large difference between the coldest and warmest temperatures. Precipitation regimes also vary: the driest areas in the western parts of the range receive as low as 165 mm annually, while the wettest areas in the south and east can receive as much as 1200 mm. Higher elevations and northern regions have cooler temperatures overall. In the western Cordillera, continental effects are modified where higher elevations and mountainous terrain produce cooler summers, warmer winters and more precipitation than is characteristic of areas in the Interior Plains. The Atlantic boreal has a strong maritime influence, with more moderate temperature extremes and high annual precipitation, including considerable snowfall (up to 400 cm). Decreasing temperatures reduce the amount of evapotranspiration, consequently wetland frequency and areal extent generally increase northward on sites with poor drainage. Southward, treed peatlands may be limited by warming temperatures, where decomposition exceeds accumulation.

*Soils/substrate:* Forested poor swamps have organic soils with shallow to deep, poorly to moderately decomposed peat, generally over finer-textured parent materials or in bedrock depressions. Richer swamps have a surface layer of well-decomposed peat over mineral parent materials and generally show evidence of a shallow or fluctuating water table. Riparian soils comprise fine- to coarse-textured mineral sediments, with little to no humus development and often show evidence of past flooding.

*Biogeography:* The primary tree species (*Larix laricina, Picea mariana, Populus balsamifera)* are fairly consistent across the range of this type. *Betula papyrifera* and *Populus tremuloides* occur infrequently across the range. *Abies balsamea* occurs in the central and eastern range, whereas *Picea glauca* is more prevalent in the west. In the southern part of the range, *Acer negundo* is found in the central region, and *Fraxinus nigra, Thuja occidentalis*, and *Ulmus americana* occur in the east.

DISTRIBUTION

\*Geographic Range: This division occurs across the boreal regions of Canada and Alaska extending into parts of the northern Great Lakes states and glaciated areas of the northeastern U.S.

Nations: CA, US

States/Provinces: AB, AK, BC, LB, MB, ME, MI, MN, NB, NH, NS, NT, NU, NY, ON, PE?, QC, SK, VT, WI, YT

USFS Ecoregions (2007) [optional]: 211:C, 212:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M299 | North American Boreal Conifer Poor Swamp |
| M300 | North American Boreal Flooded & Rich Swamp Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Swamp | National Wetlands Working Group 1997 | The definition of swamp in this publication includes all of the types included in this division, but also extends to non-boreal swamp types. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: National Wetlands Working Group (1997)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Meidinger and K. Baldwin

Acknowledgments [optional]: S. Menard

Version Date: 20 Jan 2016

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1. Forest & Woodland

1.B.5.Na. North American Boreal Flooded & Swamp Forest

M299. North American Boreal Conifer Poor Swamp

Type Concept Sentence: This boreal swamp type is found across the North American boreal region, from Alaska to Newfoundland, including poor to intermediate swamp forests, primarily on peatland soils, dominated by *Picea mariana, Larix laricina, Abies balsamea*, and/or *Betula papyrifera*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 1.B.5.Na. North American Boreal Flooded & Swamp Forest (D016)

Elcode: M299

\*Scientific Name: North American Boreal Conifer Poor Swamp Macrogroup

\*Common (Translated Scientific) Name: North American Boreal Conifer Poor Swamp Macrogroup

\*Colloquial Name: North American Boreal Conifer Poor Swamp

\*Type Concept: Boreal poor to intermediate swamp forests and woodlands develop on wet soils with permanent or semipermanent water tables at or near the soil surface, where the flow rate, subsurface depth and chemistry of groundwater determine site moisture and nutrient characteristics. These treed wetlands are common on the boreal landscape, occurring at scales ranging from small discrete patches in landscape depressions to extensive wetland complexes over large areas of level, poorly drained terrain. They usually occur on organic soils composed of sphagnum or graminoid peat. Regional west to east differences in nutrient levels: *Picea mariana* is dominant or codominant in nutrient-poor and intermediate peatlands, while *Larix laricina* occurs with *Picea mariana* across all regions in treed wetlands that are moderately well-supplied with nutrients (intermediate). In eastern Canada, *Abies balsamea* and *Betula papyrifera* also occur in intermediate wetlands; in western Canada, *Picea glauca* can be present. Several understory shrub, herb, moss and lichen species are indicative of relative moisture and nutrient status in these forests and woodlands. The poor swamps have a set of widely distributed characteristic species, such as *Ledum groenlandicum, Maianthemum trifolium, Chamaedaphne calyculata, Rubus chamaemorus, Kalmia polifolia*, and *Vaccinium oxycoccos*. Other species are regionally distributed: *Vaccinium vitis-idaea* is the primary *Vaccinium* species in western and northern Canadian poor swamps, while *Vaccinium myrtilloides* and *Vaccinium angustifolium* fill that role in eastern Canada; *Kalmia angustifolia* is an important heath component in eastern Canada.

\*Diagnostic Characteristics: This macrogroup is characterized by open stands of *Picea mariana, Larix laricina, Abies balsamea*, and/or *Betula papyrifera* on saturated peatland soils

\*Classification Comments: Terminology for wooded weakly minerotrophic wetlands is challenging. In the USNVC, poor swamps is the typical term, encompassing what are sometimes called wooded poor fens. Adding to the challenge is that thresholds for tree heights in poor swamp conditions are more often set at 2 m and 10 m. For that reason, we set a variable range of height thresholds for poor swamps at 5-10 m, with >10% cover, and we rely on a combination of vegetation structure, ecology, and floristics to help make the distinction between treed bogs and poor swamps. Types <5 m in height, on peat soils, and lacking minerotrophic indicators are treated as treed bogs and poor fens in the bog and fen formation. The short or stunted tree cover is variable. This is consistent with a number of treatments that place treed bogs with open bogs, separate from swamps. For example, Harris et al. (1996) and Rydin and Jeglum (2006) use 10 m as the cutoff for swamps versus bogs and fens, and 2 m to distinguish treed bogs from open bogs. The CNVC and USNVC more often use 5 m and 10%. Rydin and Jeglum (2006, Table 1.2) provide a key to the vegetation types based on those thresholds. Further description of this type is available from the CNVC Technical Committee [see cnvc-cnvc.ca].

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M496 | West-Central North American Boreal Forest & Woodland |  |
| M877 | North American Boreal & Subboreal Alkaline Fen |  |
| M876 | North American Boreal & Subboreal Bog & Acidic Fen |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is dominated by needle-leaved evergreen trees with an open woodland canopy. These poor swamps are 5-10 m in height with >10% canopy cover.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Regional west to east differences in nutrient levels: *Picea mariana* is dominant or codominant in nutrient-poor and intermediate peatlands, while *Larix laricina* occurs with *Picea mariana* across all regions in treed wetlands that are moderately well-supplied with nutrients (intermediate). In eastern Canada, *Abies balsamea* and *Betula papyrifera* also occur in intermediate wetlands; in western Canada, *Picea glauca* can be present. Several understory shrub, herb, moss and lichen species are indicative of relative moisture and nutrient status in these forests and woodlands. The poor swamps have a set of widely distributed characteristic species, such as *Ledum groenlandicum, Maianthemum trifolium, Chamaedaphne calyculata, Rubus chamaemorus, Kalmia polifolia*, and *Vaccinium oxycoccos*. Other species are regionally distributed: *Vaccinium vitis-idaea* is the primary *Vaccinium* species in western and northern Canadian poor swamps, while *Vaccinium myrtilloides* and *Vaccinium angustifolium* fill that role in eastern Canada; *Kalmia angustifolia* is an important heath component in eastern Canada. In Alaska, this type includes acidic swamps. *Picea mariana* is the dominant overstory species in an open canopy (30-50% canopy cover). Other overstory associates may include *Larix laricina, Picea glauca*, or, in the subboreal Rocky Mountain region, *Picea glauca x engelmannii* (hybrid white spruce). Shrubs may include *Andromeda polifolia, Betula nana, Empetrum nigrum, Vaccinium vitis-idaea, Vaccinium uliginosum, Chamaedaphne calyculata, Rubus chamaemorus, Alnus incana ssp. tenuifolia, Betula nana*, and *Ledum groenlandicum*. Characteristic herbaceous species include *Carex aquatilis, Carex pluriflora, Eriophorum angustifolium, Equisetum* spp., and *Petasites frigidus*. Moss cover is high; typical species include *Aulacomnium palustre, Tomentypnum nitens, Pleurozium schreberi, Sphagnum* spp., and *Hylocomium splendens*, among others. Well-developed bogs may have a significant lichen component in the ground layer composed largely of *Cladonia* spp.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Acidic swamps are in contact with weakly minerotrophic water, typically in peatland soils. An abundance of woody material in swamps provides another important distinction in that the peat is primarily composed of both decomposing woody material (shrub and tree) and *Sphagnum*- or sedge-dominated peats (National Wetlands Working Group 1998).

ENVIRONMENT

Environmental Description: This type often occurs as part of a larger wetland complex, where there is an adequate flow of near-surface groundwater, often along peatland edges or inactive floodplain channels. Trees root on microsites that are elevated above the water table. Soils are saturated and may be made up of well-decomposed woody peat or fine-textured mineral deposits. Stands occur on wet soils with permanent or semipermanent water tables at or near the soil surface, where the flow rate, subsurface depth and chemistry of groundwater determine site moisture and nutrient characteristics. These treed wetlands are common on the boreal landscape, occurring at scales ranging from small discrete patches in landscape depressions to extensive wetland complexes over large areas of level, poorly drained terrain. They usually occur on organic soils composed of sphagnum or graminoid peat.

DISTRIBUTION

\*Geographic Range: This macrogroup is found from eastern Canada, including the maritime region, extending south into the most northern parts of northern New England (Maine, New Hampshire, Vermont, and parts of New York) and westward into Quebec, Ontario and northern regions of the Great Lakes region (including northern Minnesota, Wisconsin and Michigan), extending through Manitoba, Saskatchewan, northwestern Alberta, northern British Columbia and boreal Alaska.

Nations: CA, US

States/Provinces: AB, AK, BC, MB, ME, MI, MN, NB, NH, NS, NY, ON, PE?, VT, WI, YT

USFS Ecoregions (2007) [optional]: 211A:CC, 211B:CC, 211C:CC, 211D:CC, 212Ha:CCC, 212Hb:CCC, 212Hc:CCC, 212Hd:CCC, 212He:CCC, 212Hf:CCC, 212Hg:CCC, 212Hh:CCC, 212Hi:CCC, 212Hj:CCC, 212Hk:CCC, 212Hl:CCC, 212Hm:CCC, 212K:CC, 212L:CC, 212M:CC, 212N:CC, 212Ra:CCC, 212Rb:CCC, 212Rc:CCC, 212Rd:CCC, 212Re:CCC, M211A:CC, M211B:CC, M211C:CC, M211D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G807 | Atlantic Boreal Black Spruce - Balsam Fir Poor Swamp |
| G806 | Ontario-Québec Boreal Black Spruce Poor Swamp |
| G843 | West-Central Boreal Black Spruce - Tamarack Poor Swamp |
| G546 | Alaskan-Yukon Boreal Black Spruce Wet Forest |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2011-04-08 | M038 Central & Eastern Boreal Flooded & Swamp Forest Macrogroup | M038 split into M299 & M300 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Fpn Northern Forest Rich Peatland System | Minnesota DNR 2003 |  |
| > | I.A.2.f - Black spruce (open) | Viereck et al. 1992 |  |
| > | I.A.2.h - Black spruce-tamarack (open) | Viereck et al. 1992 |  |
| > | I.A.3.d - Black spruce (woodland) | Viereck et al. 1992 |  |
| > | II.B.1.f. - Closed tall shrub swamp | Viereck et al. 1992 |  |
| > | II.B.2.f - Open tall shrub swamp | Viereck et al. 1992 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: K. Baldwin and CNVC Technical Committee

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Meidinger, D. Faber-Langendoen, K. Baldwin, G. Kittel

Acknowledgments [optional]:

Version Date: 29 Mar 2017

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2. Shrub & Herb Vegetation

Grasslands, shrublands, open tree savannas, marshes, bogs and fens dominated by broadly mesomorphic (including scleromorphic) shrub and herb growth forms (including *broad-leaved, needle-leaved*, and *sclerophyllous shrubs*, and *forb* and *graminoid herbs*) with an irregular horizontal canopy structure, mesomorphic trees typically <10% cover (but tropical tree savannas typically <40%), tropical to boreal and subalpine climates, and wet to dry substrate conditions.

2.A. Tropical Grassland, Savanna & Shrubland

Tropical Grassland, Savanna & Shrubland is dominated by mesomorphic grasses and shrubs, with or without scattered trees (but trees typically <40% cover), ranging from tropical coastal to inland lowland and montane grasslands and shrublands. Stands are found in warm tropical continental climates, typically from the equator to about 23°N and S latitude, with low or pronounced rainfall seasonality, with either one or two short dry seasons, or one long dry season, but frost virtually absent.

2.A.1. Tropical Lowland Grassland, Savanna & Shrubland

Tropical Lowland Grassland, Savanna & Shrubland is characterized by a ground layer with a more-or-less continuous grass or graminoid layer, or mixed forb layer that may have up to 80-90% shrub cover and/or typically <40% tree cover, and <8 m tall. Shrubs are predominantly broad-leaved evergreen and deciduous, but sclerophyllous growth forms are also included. Stands are found in warm tropical continental climates, with low or pronounced rainfall seasonality, with either one or two short dry seasons, or one long dry season.

2. Shrub & Herb Vegetation

2.A.1.Ea. Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland

D094. Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.1.Ea. Tropical Lowland Grassland, Savanna & Shrubland (F019)

Elcode: D094

\*Scientific Name: Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland Division

\*Common (Translated Scientific) Name: Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland Division

\*Colloquial Name: Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland

\*Type Concept: Among the grasslands and savannas included in this Division, the most important by far is the extensive savanna region on the left (north and west) side of the Orinoco River in Colombia and Venezuela, also known as Llanos. Four distinct savanna vegetation subregions exist in the Llanos, reflecting drainage differences, all of them dominated by perennial grasses: the Overflow Plains, the Aeolian Plains, the High Plains, and the Piedmont Savannas.

Range: Venezuela and Colombia, about 500,000 square km.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BS, BZ, CO, CR, CU, DO, GT, HN, HT, JM, MX, NI, PA, PR, SV, TT, US, VI, XC, XD

States/Provinces: FL

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M671 | Caribbean Dry Scrub |
| M669 | Caribbean Palm Savanna |
| M672 | Northern Mesoamerican Pine Savanna |
| M673 | Northern Mesoamerican Savanna & Shrubland |
| M515 | Caribbean-Mesoamerican Lowland Ruderal Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date: 07 Dec 2015

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\*References [Required if used in text]:

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2. Shrub & Herb Vegetation

2.A.1.Ea. Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland

M671. Caribbean Dry Scrub

Type Concept Sentence: This dry scrub macrogroup, found in the Florida Keys and most of the Caribbean islands, varies widely in floristic composition across its distribution but has a broadly similar set of ecological factors, including highly seasonal precipitation and limiting substrate conditions, such as ultramafic soils, exposed limestone, dogtooth limestone, or coastal rock pavements, limestone terraces, and boulderfields exposed to wind and salt spray. The vegetation is typically open, with a low-statured canopy formed by small trees and shrubs, where often cacti are dominant or codominant. Floristic diversity is relatively low and endemism levels are very high.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Ea. Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland (D094)

Elcode: M671

\*Scientific Name: *Pithecellobium unguis-cati - Opuntia* spp. - *Agave* spp. Scrub Macrogroup

\*Common (Translated Scientific) Name: Catclaw Blackbead - Prickly-pear species - Agave species Scrub Macrogroup

\*Colloquial Name: Caribbean Dry Scrub

\*Type Concept: This macrogroup encompass tropical and subtropical dry scrub distributed in the Florida Keys and most of the Caribbean islands. The physiognomy of the vegetation types included is varied: from an open, primarily herbaceous community with scattered shrubs and columnar and tree-shaped cacti, to a mixed evergreen, drought-deciduous scrub (stunted trees, shrubs and low palms) with succulents, which can be dense and varying in height from 0.4 to 4 m. Stands of serpentine scrubs that alternate with small grassy clearings also occur, as well as sand savannas. Common plant growth forms include evergreen sclerophyllous and microphyllous shrubs, small or arborescent cacti, plants in rosettes (such as agaves and terrestrial bromeliads), semi-deciduous shrubs, and emergent palms. The ecology is characterized by a dry season of 2-6 months and occurs on limiting substrate conditions related to the presence of ultramafic soils, exposed limestone, dogtooth limestone, or rocky areas of Key Largo limestone with little soil or leaf litter. Most commonly these environmental characteristics are present in coastal areas; however, inland communities can occur growing on ferrallitic soils, which are derived from serpentine in isolated locations in the lowlands. Habitat diversity in this edaphoxerophylous system is spatially very heterogeneous and patchy. Given that this type develops under limiting environmental factors, variation in the dry season period, topography, and substrate determines the specific characteristics of the vegetation communities in this macrogroup since all of these factors have great importance as determinants of variation in water availability and physiological adaptations.

\*Diagnostic Characteristics: Stands are characterized by an overstory of scattered shrubs (*Cordia* spp. *Erithalis fruticosa*), stunted trees (*Eugenia, Bursera, Thouinia, Coccoloba* spp.) or short-statured palms (*Coccothrinax* spp.), and herbaceous communities with grasses or sedges codominated by *Agave* spp. and small or columnar cacti (*Melocactus, Opuntia, Harrisia, Pilosocereus*). The canopy layer varies from very open to closed depending on the site conditions.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The physiognomy of the vegetation types included is varied: from an open, primarily herbaceous community with scattered shrubs in the Florida Keys, to a mixed evergreen, drought-deciduous scrub of stunted trees, shrubs, low palms, and succulents, which can be dense and varying in height from 0.4 to 4 m with scattered emergent trees or palms; the latter physiognomy is more common of the communities in the Caribbean islands. Stands of serpentine scrubs that alternate with small grassy clearings also occur in Cuba and Puerto Rico. The macrogroup includes edaphic savannas growing on silica sands that support short grass and sedge savanna with palms and sometimes with pines (WWF and IUCN 1997). In the scrub community types, common plant growth forms include evergreen sclerophyllous and microphyllous shrubs, small or arborescent cacti, plants in rosettes (such as agaves and terrestrial bromeliads), semi-deciduous shrubs, and emergent palms. The scrub physiognomy is determined by a combination of low rainfall, which may be less than 700 mm per year (WWF and IUCN 1997) and the harsh conditions imposed by the substrate.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: In the Florida Keys the cactus barren community pertaining to this macrogroup consists of a wide variety of herbaceous and succulent species which characteristically includes cacti, agaves, stunted trees, and several rare herbs. These frequently occur with grasses and sedges, such as *Leptochloa dubia, Paspalidium chapmanii*, and *Cyperus elegans* (Avery 1982, as cited in FNAI 2010a). Spiny species, particularly the rare *Opuntia triacantha*, are characteristic but their abundance is variable. Other spiny species include *Agave decipiens, Acanthocereus tetragonus*, and *Opuntia stricta*. Scattered clumps of stunted trees may be present, including *Bursera simaruba, Conocarpus erectus, Eugenia foetida*, and *Pithecellobium unguis-cati* (Avery 1982, as cited in FNAI 2010a). Diagnostic species vary across the Caribbean islands; the Cuban scrub on limestone substrate is dominated by the shrubs *Auerodendron cubense, Coccothrinax munizii, Cordia leucosebestena, Eugenia cowellii, Jacquinia berteroi, Picrodendron macrocarpum, Polygala guantanamana, Randia spinifex*, and cacti and succulents *Agave albescens, Consolea macracantha, Dendrocereus nudiflorus, Harrisia fernowii, Melocactus acunae*, and *Pilosocereus brooksianus* (Huggins et al. 2007), while this type in Puerto Rico features endemic *Harrisia portoricensis*, and shrubs *Croton discolor, Croton betulinus, Erithalis fruticosa, Plumeria obtusa*, and *Reynosia uncinata* (Rojas-Sandoval and Melendez-Ackerman 2012b, Medina et al. 2014).

In the Lesser Antilles typical species of the mixed cactus scrub on limestone pavement include *Agave karatto, Capparis cynophallophora, Capparis indica, Clerodendrum aculeatum, Haematoxylon campechianum, Leucaena leucocephala, Pilosocereus royenii, Pisonia aculeata, Pisonia subcordata*, and *Pithecellobium unguis-cati* (Areces-Mallea et al. 1999). In Bahamas, when the limestone pavement community occurs right above the water table and there is more moisture available, characteristic species include *Sideroxylon americanum (= Bumelia americana), Bursera simaruba, Cephalocereus* sp., *Cladium mariscus ssp. jamaicense, Coccoloba northropiae, Coccoloba tenuifolia, Guettarda scabra, Manilkara jaimiqui ssp. emarginata (= Manilkara bahamensis), Pithecellobium bahamense, Psidium longipes, Randia aculeata, Stigmaphyllon sagraeanum*, and *Tabebuia bahamensis* (Areces-Mallea et al. 1999). On serpentine derived soils present in Puerto Rico and Cuba, characteristic species include *Comocladia dodonaea, Croton lucidus, Pictetia aculeata, Pilosocereus royenii, Plumeria alba, Thouinia striata var. portoricensis* and evergreen trees *Acrosynanthus minor, Annona bullata, Antirhea abbreviata, Antirhea orbicularis, Byrsonima bucheri, Exostema purpureum, Hemithrinax savannarum, Jacquinia shaferi, Myrtus cabanesensis, Neobracea valenzuelana, Phyllanthus comosus, Phyllanthus orbicularis, Rondeletia camarioca, Spirotecoma apiculata*, and *Tabebuia linearis*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The natural process giving rise to cactus barrens in the Florida Keys is not known, but since they occur on sites where the thin layer of organic soil over limestone bedrock is missing, they may have formed by soil erosion following destruction of the plant cover by fire, storm, or artificial clearing. The edaphic shortgrass savannas have been characterized in Cuba as a natural community (*Schizachyrium tenerum, Leptocoryphium lanatum, Byrsonima*) by Fiala and Herrera (1988) but other studies (Borhidi 1988) state that the original vegetation of these soil types is a thorny scrub/woodland consisting of endemic palms and trees which has been converted long ago to open palm grasslands, and used intensively as pastures. Thus, ~Caribbean Moist Shortgrass Savanna Group (G465)$$, included in this macrogroup, should be considered a seral stage resulting from the past intense disturbance of the thorny scrub referred to by Borhidi (1988).

ENVIRONMENT

Environmental Description: *Climate:* At sea level, temperatures in February, which is often the coolest and driest month, rarely fall to 12°C. Rainy seasons are usually warmer, but temperature maxima rarely reach 33°C. Overall averages at sea level are mostly in the range 25-27°C. Annual precipitation ranges from 600 to 1500 mm for the distribution range of this macrogroup and the dry season is usually limited to one period that can last for 2-6 months, or divided into two periods together lasting up to 8 months. The main dry period is usually between January and April; there may be a second dry period in more southerly latitudes in July to September.

*Soil/substrate/hydrology:* The limestone substrate has low water-retention capacity, and rainfall leaches easily after accumulating in cracks and crevices of variable depth. The underlying calcareous rock is prone to erosion in the presence of water acidified with CO2 from the atmosphere or contributed by root respiration and decomposition of organic matter in the litter layer (Lugo et al. 2001 cited in Medina et al. 2014). The major nutrient sources in these areas are probably cations adsorbed by the clay accumulated in cracks and crevices, and deposited on the bottom of the depressions (Medina et al. 2014). The macrogroup includes edaphic savannas growing on silica sands and in seasonal conditions that result in actual drought during periods of low rainfall and physiological drought due to impeded drainage and waterlogging during periods of high rainfall. These savannas are level and usually have topsoils of silica sands with impervious subsoil horizons. They occur in Cuba, Jamaica, Puerto Rico and Trinidad and are renowned for their local floristic diversity in contrast to savannas derived from removal of the woodlands and periodical fire and grazing. (WWF and IUCN 1997).

DISTRIBUTION

\*Geographic Range: This macrogroup is distributed in the Florida Keys and most of the islands of the Greater and Lesser Antilles.

Nations: BS, CU, DO, HT, JM, PR, TT, US, VI, XC, XD

States/Provinces: FL

USFS Ecoregions (2007) [optional]: 411A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G485 | Caribbean Coastal Cactus Scrub |
| G479 | Caribbean Karstic Dry Scrub |
| G463 | Caribbean Serpentine Dry Scrub |
| G465 | Caribbean Moist Shortgrass Savanna |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M295 Caribbean Serpentine Dry Forest Macrogroup | M295 concept covered by M671 |
| 2013-05-10 | M670 Antillean Mixed Evergreen & Deciduous Shrubland Macrogroup | M670 concept covered by M671 |
| 2013-05-10 | M288 Caribbean Thorn Woodland Macrogroup | M288 is redundant with M671 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 13 Apr 2015

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2. Shrub & Herb Vegetation

2.A.1.Ea. Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland

M672. Northern Mesoamerican Pine Savanna

Type Concept Sentence: Sabanas tropicales de pino, algunos con característica inundación estancional, distribuidas en el sur de México y Centroamérica.

Tropical pine savannas, some with characteristic seasonal inundation found in southern Mexico and Central America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Ea. Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland (D094)

Elcode: M672

\*Scientific Name: Northern Mesoamerican Pine Savanna Macrogroup

\*Common (Translated Scientific) Name: Northern Mesoamerican Pine Savanna Macrogroup

\*Colloquial Name: Northern Mesoamerican Pine Savanna

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Intervalo de incendios: la frecuencia de incendios deben estar dentro de un rango esperado para el tipo (por ejemplo, 5 a 20 años); incendios demasiado frecuentes dan como resultado la pérdida de la diversidad nativa y la supresión de resulta en una densa invasión de especies leñosas (y la pérdida de especies nativas).

La sequía y el régimen de crecidas: Donde están inundadas las sabanas de pino, en general también hay una estación seca de 3-9 meses. La densidad de arboles y arbustos tiende a ser mayor cuando la la inundación es más profunda. La distribución de clases de edad de los pinos forma una curva de J invertida que refleja una amplia gama de diámetros resultantes de perturbaciones periódicas y regeneración exitosa.

Fire Return Interval: fire frequency should fall within an expected range for the type (e.g., 5-20 years); too frequent fires result in loss of native diversity and fire suppression results in dense woody species encroachment (and loss of native species).

Drought and Flood Regime: Where pine savannas are inundated, there is generally a 3-9 month dry season. Tree and shrub density tends to be higher with deeper inundation. Age class distribution of pine trees forms an inverted J curve reflecting a full range of diameters resulting from periodic disturbance and successful regeneration.

ENVIRONMENT

Environmental Description: Sarmiento (1983) reconoce tres tipos de sabanas neotropicales: (1) Sabana Semiestacional que se produce en un clima más húmedo, con una o dos temporadas cortas secas e incendios menos frecuentes (algunas de las sabanas amazónicas y de Guayana), (2) Sabana Estacional se caracteriza por una estación seca severa y los frecuentes incendios (por ejemplo, el Cerrado y los Llanos), (3) Sabana Hyperestacional que es el resultado de la sequía y los incendios excesivos durante la temporada seca y grandes inundaciones durante la estación lluviosa. Este tipo sabana es común en las tierras bajas de mal drenaje del Pantanal, Llanos de Moxos, las sabanas de Roraima-Rupununi, y parte de los Llanos. Rodales de palmeras se encuentran a menudo en las zonas anegadas.

El sistema de la sabana es generalmente heterogéneo, consiste en un mosaico de pastizales puros, parches de árboles o arbustos, bosques secos o semideciduos, bosques de galería y en ocasiones, los humedales. La distribución de las distintas comunidades en un paisaje de sabana a menudo sigue gradientes edáficos (por ejemplo, los tipos de suelo o niveles de la capa freática) (Daly y Mitchell 2000).

Al igual que otras sabanas tropicales, la sabana de pino es un ecosistema estructuralmente simple pero espacialmente irregular. Se caracteriza por una capa de plantas herbáceas -principalmente C 4, pastos y juncos, y herbáceas C3 - con diversos grados de arbustos y / o árboles, es decir, un continuo que va desde pastizales sin árboles hasta parches de bosques densos. Las sabanas se dan en climas cálidos con precipitaciones que varían entre (750) 1.000 mm y 2.000 (-2.500) mm y un período seco de uno a seis meses, ocupan una zona de transición entre el bosque húmedo y la vegetación xerófila. La distribución de las precipitaciones es un factor determinante de los tipos de vegetación de sabana (por ejemplo, pastizales o bosques). La sabana tropical generalmente se desarrolla en suelos deficientes en nutrientes, ácidos con la toxicidad del aluminio y con alteración pronunciada de condiciones húmedas y secas (Fry 1983).

La relación / tallo alto raíz en los ecosistemas de sabana, especialmente en el estrato herbáceo, es una característica que proporciona resistencia al estrés y la perturbación causados por la sequía, el fuego y la herbivoría. Se cree que las sabanas tropicales se han desarrollado bajo factores de perturbación como el fuego, la herbivoría y sequía. La persistencia de las sabanas puede depender de que la perturbación de preservar la estabilización de los componentes y propiedades (Coupland 1992c, Baruch et al. 1996, Silva 1996).

Sarmiento (1983) recognizes three types of Neotropical savannas: (1) Semiseasonal savanna which occurs in a rather humid climate with one or two short dry seasons and less frequent fires (some of the Amazonian and Guianan savannas), (2) Seasonal savanna characterized by a severe dry season and frequent fires (e.g., the Cerrado and the Llanos), (3) Hyperseasonal savanna which is the result of excessive drought and fires during dry season and severe flooding during the wet season. This savanna type is common in the poorly drained bottomlands of the Pantanal, Llanos de Moxos, the Roraima-Rupununi savannas, and part of Llanos. Palm stands are often found in water-logged areas.

The savanna system is usually heterogeneous, consisting of a mosaic of pure grasslands, patches of trees or shrubs, dry or semi-deciduous forests, gallery forests, and sometimes wetlands. The distribution of various communities in a savanna landscape often follows edaphic gradients (e.g., soil types or levels of water table) (Daly and Mitchell 2000). Like other tropical savannas, pine savanna is structurally simple but spatially patchy ecosystem. It is characterized by a layer of herbaceous plants- mainly C 4 grasses and sedges, and C3 forbs- with varying degrees of shrubs and/or trees, that is, a continuum from treeless grassland to dense woodland.

Savannas occur in hot climates with rainfall varying between (750-) ,000 mm and 2000 (-2500) mm and a dry period of one to six months, forming a transition zone between moist forest and xerophytic vegetation. Rainfall distribution is a major determinant of the savanna vegetation types (e.g., grassland or woodland). Tropical savanna usually develops on nutrient deficient, acidic soils with aluminum toxicity and pronounced alteration of wet and dry conditions (Fry 1983).

The high root/shoot ratio in savanna ecosystems, especially within the herbaceous layer, is a feature that provides resistance to stress and disturbance from drought, fire, and herbivory. It is believed that tropical savannas have developed under disturbance factors like fire, herbivory and drought. Persistence of savannas may depend on such disturbance to preserve stabilizing components and properties (Coupland 1992, Baruch et al. 1996, Silva 1996).

DISTRIBUTION

\*Geographic Range: En Mesoamérica, los parches de sabana de pino (*Pinus caribaea*) ocurren en el sureste de Chiapas, Izabal y Petén central de Guatemala, y a lo largo de la costa atlántica de Belice, el este de Honduras, y el este de Nicaragua. La vegetación se caracteriza por rodales abiertos de *Pinus caribaea, Curatella americana* y *Byrsonima crassifolia* en una matriz de gramineas, juncos y hierbas (principalmente leguminosas y compuestas) (Greller 2000).

In Mesoamerica, patches of pine savanna (*Pinus caribaea*) occur in southeastern Chiapas, Izabál and central Petén of Guatemala, and along the Atlantic Coast of Belize, eastern Honduras, and eastern Nicaragua. The vegetation is characterized by open stands of *Pinus caribaea, Curatella americana*, and *Byrsonima crassifolia* in a matrix of grasses, sedges and forbs (mainly legumes and composites) (Greller 2000).

Nations: BZ, HN, MX, NI

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
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DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M343 Central American Shrubland & Savanna Macrogroup | M343 reconfigured into M672, M673, M674, M675 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date: 08 Jan 2015

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2. Shrub & Herb Vegetation

2.A.1.Ea. Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland

M673. Northern Mesoamerican Savanna & Shrubland

Type Concept Sentence: Sabanas tropicales de pino, algunos con característica inundación seasnal, distribuidas en el sur de México y Centroamérica.

Tropical pine savannas, some with characteristic seasonal inundation found in southern Mexico and Central America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Ea. Caribbean-Mesoamerican Lowland Grassland, Savanna & Shrubland (D094)

Elcode: M673

\*Scientific Name: Northern Mesoamerican Savanna & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Northern Mesoamerican Savanna & Shrubland Macrogroup

\*Colloquial Name: Northern Mesoamerican Savanna & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Intervalo de incendios: la frecuencia de incendios deben estar dentro de un rango esperado para el tipo (por ejemplo, 5 a 20 años); incendios demasiado frecuentes dan como resultado la pérdida de la diversidad nativa y la supresión de resulta en una densa invasión de especies leñosas (y la pérdida de especies nativas).

La sequía y el régimen de crecidas: Donde están inundadas las sabanas de pino, en general también hay una estación seca de 3-9 meses. La densidad de arboles y arbustos tiende a ser mayor cuando la la inundación es más profunda. La distribución de clases de edad de los pinos forma una curva de J invertida que refleja una amplia gama de diámetros resultantes de perturbaciones periódicas y regeneración exitosa.

Fire Return Interval: fire frequency should fall within an expected range for the type; too frequent fires result in loss of native diversity and fire suppression results in dense woody species encroachment (and loss of native species).

Drought and Flood Regime: Where pine savannas are inundated, there is generally a 3-9 month dry season. Tree and shrub density tends to be higher with deeper inundation. Age class distribution of pine trees forms an inverted J curve reflecting a full range of diameters resulting from periodic disturbance and successful regeneration.

ENVIRONMENT

Environmental Description: Sarmiento (1983) reconoce tres tipos de sabanas neotropicales: (1) Sabana Semiestacional que se produce en un clima más húmedo, con una o dos temporadas cortas secas e incendios menos frecuentes (algunas de las sabanas amazónicas y de Guayana), (2) Sabana Estacional se caracteriza por una estación seca severa y los frecuentes incendios (por ejemplo, el Cerrado y los Llanos), (3) Sabana Hyperestacional que es el resultado de la sequía y los incendios excesivos durante la temporada seca y grandes inundaciones durante la estación lluviosa. Este tipo sabana es común en las tierras bajas de mal drenaje del Pantanal, Llanos de Moxos, las sabanas de Roraima-Rupununi, y parte de los Llanos. Rodales de palmeras se encuentran a menudo en las zonas anegadas.

El sistema de la sabana es generalmente heterogéneo, consiste en un mosaico de pastizales puros, parches de árboles o arbustos, bosques secos o semideciduos, bosques de galería y en ocasiones, los humedales. La distribución de las distintas comunidades en un paisaje de sabana a menudo sigue gradientes edáficos (por ejemplo, los tipos de suelo o niveles de la capa freática) (Daly y Mitchell 2000).

Al igual que otras sabanas tropicales, la sabana de pino es un ecosistema estructuralmente simple pero espacialmente irregular. Se caracteriza por una capa de plantas herbáceas -principalmente C 4, pastos y juncos, y herbáceas C3 - con diversos grados de arbustos y / o árboles, es decir, un continuo que va desde pastizales sin árboles hasta parches de bosques densos. Las sabanas se dan en climas cálidos con precipitaciones que varían entre (750) 1,000 mm y 2,000 (-2,500) mm y un período seco de uno a seis meses, ocupan una zona de transición entre el bosque húmedo y la vegetación xerófila. La distribución de las precipitaciones es un factor determinante de los tipos de vegetación de sabana (por ejemplo, pastizales o bosques). La sabana tropical generalmente se desarrolla en suelos deficientes en nutrientes, ácidos con la toxicidad del aluminio y con alteración pronunciada de condiciones húmedas y secas (Fry 1983).

La relación / tallo alto raíz en los ecosistemas de sabana, especialmente en el estrato herbáceo, es una característica que proporciona resistencia al estrés y la perturbación causados por la sequía, el fuego y la herbivoría. Se cree que las sabanas tropicales se han desarrollado bajo factores de perturbación como el fuego, la herbivoría y sequía. La persistencia de las sabanas puede depender de que la perturbación de preservar la estabilización de los componentes y propiedades (Coupland 1992c, Baruch et al. 1996, Silva 1996).

Sarmiento (1983) recognizes three types of Neotropical savannas: (1) Semiseasonal savanna which occurs in a rather humid climate with one or two short dry seasons and less frequent fires (some of the Amazonian and Guianan savannas), (2) Seasonal savanna characterized by a severe dry season and frequent fires (e.g., the Cerrado and the Llanos), (3) Hyperseasonal savanna which is the result of excessive drought and fires during dry season and severe flooding during the wet season. This savanna type is common in the poorly drained bottomlands of the Pantanal, Llanos de Moxos, the Roraima-Rupununi savannas, and part of Llanos. Palm stands are often found in water-logged areas.

The savanna system is usually heterogeneous, consisting of a mosaic of pure grasslands, patches of trees or shrubs, dry or semideciduous forests, gallery forests, and sometimes wetlands. The distribution of various communities in a savanna landscape often follows edaphic gradients (e.g., soil types or levels of water table) (Daly and Mitchell 2000). Like other tropical savannas, pine savanna is structurally simple but spatially patchy ecosystem. It is characterized by a layer of herbaceous plants- mainly C 4 grasses and sedges, and C3 forbs- with varying degrees of shrubs and/or trees, that is, a continuum from treeless grassland to dense woodland. Las sabanas se dan en climas cálidos con precipitaciones que varían entre (750) 1000 mm to 2000 (-2500) mm y un período seco de uno a seis meses, la formación de una zona de transición entre el bosque húmedo y la vegetación xerófila. Distribución de las precipitaciones es un factor determinante de los tipos de vegetación de sabana (por ejemplo, pastizales o bosques). Sabana tropical generalmente se desarrolla en suelos deficientes en nutrientes, ácidos con la toxicidad del aluminio y alteración pronunciada de condiciones húmedas y secas (Fry 1983).

Savannas occur in hot climates with rainfall varying between (750-) 1000 mm and 2000 (-2,500) mm and a dry period of one to six months, forming a transition zone between moist forest and xerophytic vegetation. Rainfall distribution is a major determinant of the savanna vegetation types (e.g., grassland or woodland). Tropical savanna usually develops on nutrient deficient, acidic soils with aluminum toxicity and pronounced alteration of wet and dry conditions (Fry 1983).

The high root/shoot ratio in savanna ecosystems, especially within the herbaceous layer, is a feature that provides resistance to stress and disturbance from drought, fire, and herbivory. It is believed that tropical savannas have developed under disturbance factors like fire, herbivory and drought. Persistence of savannas may depend on such disturbance to preserve stabilizing components and properties (Coupland 1992c, Baruch et al. 1996, Silva 1996).

DISTRIBUTION

\*Geographic Range: En México las sabanas se desarrollan mejor en el sureste, en Campeche, Tabasco, Chiapas y Veracruz. También ocurren, pero de tamaño reducido, en la costa del Pacífico, desde Chiapas hasta Sinaloa. En Mesoamérica, los parches de sabana de pino (*Pinus caribaea*) ocurren en el sureste de Chiapas, Izabal y Petén central de Guatemala, ya lo largo de la costa atlántica de Belice, el este de Honduras, y el este de Nicaragua. La vegetación se caracteriza por rodales abiertos de *Pinus caribaea, Curatella americana* y *Byrsonima crassifolia* en una matriz de gramíneas, juncos y hierbas (principalmente leguminosas y compuestas) (Greller 2000).

In Mexico savannas are best developed in the southeast, in Campeche, Tabasco, Chiapas, and Veracruz. They also occur, much reduced in size, on the Pacific Coast from Chiapas to Sinaloa. In Mesoamerica, patches of pine savanna (*Pinus caribaea*) occur in southeastern Chiapas, Izabál and central Petén of Guatemala, and along the Atlantic Coast of Belize, eastern Honduras, and eastern Nicaragua. The vegetation is characterized by open stands of *Pinus caribaea, Curatella americana*, and *Byrsonima crassifolia* in a matrix of grasses, sedges and forbs (mainly legumes and composites) (Greller 2000).

Nations: CR, GT, HN, MX, NI, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M343 Central American Shrubland & Savanna Macrogroup | M343 reconfigured into M672, M673, M674, M675 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date: 08 Jan 2015

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\*References [Required if used in text]:

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2. Shrub & Herb Vegetation

2.A.1.Eb. Amazonian Savanna & Shrubland

D124. Amazonian Savanna & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.1.Eb. Tropical Lowland Grassland, Savanna & Shrubland (F019)

Elcode: D124

\*Scientific Name: Amazonian Savanna & Shrubland Division

\*Common (Translated Scientific) Name: Amazonian Savanna & Shrubland Division

\*Colloquial Name: Amazonian Savanna & Shrubland

\*Type Concept: Savannas are a restricted vegetation formation in the Amazon basin. They occur in comparatively small extensions localized in different parts of the basin. The occurrence of natural savannas in the Amazon basin is correlated with characteristic edaphic conditions, more commonly sandy soils. These savannas are similar to other savannas of the continent in the range of physiognomic types, from open with few scattered woody elements to parklands (trees/shrubs are aggregated), to woodlands. Like with other savannas, the variation is correlated with drainage conditions and soil nutrients.

Range: Northwestern Brazil, adjacent southeastern Colombia and southwestern Venezuela, southeastern Peru and northern Bolivia.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, CO, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M346 | Central Amazon Savanna |
| M345 | Western Amazon Savanna |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

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\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

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2. Shrub & Herb Vegetation

2.A.1.Eb. Amazonian Savanna & Shrubland

M346. Central Amazon Savanna

Type Concept Sentence: Savannas distributed in the south-central Amazon Basin in Brazil on hilly topographies and rocky substrates; transitional toward the Cerrado biome. Also includes scattered, non-flooded savannas growing in the central Amazon region of Brazil. The common element is the presence of gravel-like soils from laterite outcrops. These savannas have floristic affinities with the Cerrado (*Byrsonima crassifolia, Byrsonima verbasifolia, Caryocar brasiliense, Curatella americana, Dypterix alata, Leptocoryphium lanatum, Qualea grandiflora, Qualea parviflora, Salvertia convallariodora, Syagrus petraea*). Also includes savannas with sandy soils on the topographic uplands in the proximity to the Amazon estuary.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Eb. Amazonian Savanna & Shrubland (D124)

Elcode: M346

\*Scientific Name: Central Amazon Savanna Macrogroup

\*Common (Translated Scientific) Name: Central Amazon Savanna Macrogroup

\*Colloquial Name: Central Amazon Savanna

\*Type Concept: The savannas in this macrogroup represent those distributed in the south-central Amazon Basin in Brazil on hilly and rocky topographies and substrates transitional towards the northern distributional range of the Cerrado biome, where the Brazilian Shield meets the Amazonian plains. It also includes scattered, non-flooded savannas growing in the central Amazon region of Brazil. The common element is the presence of gravel-like soils from laterite outcrops, though they combine with different substrates (sand, clay, others.) The ones on flat terrain occurring in relative proximity to varzea forest might seasonally have access to the water table. These savannas have floristic affinities with the Cerrado (*Curatella americana, Anacardium microcarpum, Salvertia convallariodora, Hancornia speciosa, Qualea grandiflora, Byrsonima crassifolia, Byrsonima verbasifolia, Antonia ovata, Trachypogon* spp., *Leptocoryphium lanatum, Syagrus petraea, Caryocar brasiliense, Dypterix alata, Bowdichia virgilioides, Qualea parviflora, Pterodon emarginatus, Protium aracouchini*), but in this case the occurrences are surrounded by Amazon forests. The macrogroup also includes savannas with a significant presence of sand in the soil, which are common in the proximity to the Amazon estuary, on the topographic uplands but surrounded by herbaceous marshes; common species in this case are *Paratheria prostrata* and *Curatella americana*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G757 | South-Central Amazon Savanna |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

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\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.1.Eb. Amazonian Savanna & Shrubland

M345. Western Amazon Savanna

Type Concept Sentence: Savanna formations occurring within the matrix of Amazonian rainforests in the western Amazon Basin. These are savannas with a woody stratum grow in a humid seasonal climate on well-drained soils forming mounts. The woody component is scattered, with trees or shrubs that have sclerophyllous leaves. Diagnostic species include *Byrsonima linguifera, Caraipa llanorum, Cariniana multiflora, Caryocar brasiliense, Curatella americana, Licania sclerophylla, Qualea grandiflora*, and *Vochysia rufa*. In Colombia these savannas occur at the foothills of the Sierra de la Macarena. Grasses reach up to 0.6 m high, with species such as *Andropogon leucoctachyus, Axonopus aureus, Setaria parviflora*, and *Trachypogon plumosus*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Eb. Amazonian Savanna & Shrubland (D124)

Elcode: M345

\*Scientific Name: Western Amazon Savanna Macrogroup

\*Common (Translated Scientific) Name: Western Amazon Savanna Macrogroup

\*Colloquial Name: Western Amazon Savanna

\*Type Concept: The macrogroup represents the few savanna formations occurring within the matrix of Amazonian rainforests in the western Amazon Basin. These are savannas with a woody stratum growing in a humid seasonal climate, on well-drained soils forming mounts. The woody component is scattered, short and with trees or shrubs that have sclerophyllous leaves, with diagnostic species such as *Byrsonima linguifera, Caraipa llanorum, Cariniana multiflora, Caryocar brasiliense, Curatella americana, Licania sclerophylla, Qualea grandiflora*, and *Vochysia rufa*. Some occurrences are located in the southwestern Amazon in Bolivia (Heath, Ixiamas e Iturralde), southern Peru, and Brazil, while another important extent occurs in Colombia at the southern foothills of the Sierra de la Macarena. The herbaceous component is dominated by grasses and sedges up to 0.6 m high, with species such as *Andropogon leucoctachyus, Axonopus aureus, Setaria parviflora*, and *Trachypogon plumosus*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, CO, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G758 | Western Amazon Savanna |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.1.Ed. Brazilian-Parana Lowland Grassland, Savanna & Shrubland

D126. Brazilian-Parana Lowland Grassland, Savanna & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.1.Ed. Tropical Lowland Grassland, Savanna & Shrubland (F019)

Elcode: D126

\*Scientific Name: Brazilian-Parana Lowland Grassland, Savanna & Shrubland Division

\*Common (Translated Scientific) Name: Brazilian-Parana Lowland Grassland, Savanna & Shrubland Division

\*Colloquial Name: Brazilian-Parana Lowland Grassland, Savanna & Shrubland

\*Type Concept: The largest area of tropical savanna in South America occurs on the oldest surfaces of the Brazilian Shield. Since almost all of it lies in Brazil, the overall name given to these savannas is C*errado*, a Portuguese word that means "closed" and refers to the dense woodland vegetation that occur across extensive areas. Here again, all of the general types of savanna are found; the difference is their richness, an estimated 10,000 species occur in the cerrados, the highest plant diversity of all the world's savannas, with an estimated 40% endemics.

Range: Central Brazil and outliers in adjacent Bolivia. The Beni savannas of Bolivia are floristically related to the Cerrados.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, BR, PY, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M684 | Brazilian Atlantic Coastal Plain Savanna & Woodland |
| M688 | Parana Upland Savanna & Shrubland |
| M685 | Cerrado Savanna |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Woodward, S. 2008. Grassland biomes. Greenwood Press, Westport, CT.

2. Shrub & Herb Vegetation

2.A.1.Ed. Brazilian-Parana Lowland Grassland, Savanna & Shrubland

M684. Brazilian Atlantic Coastal Plain Savanna & Woodland

Type Concept Sentence: Savanna vegetation on sandy soils of the coastal plains of Brazil. In the north, savannas occur as enclaves that develop on the deeper sandy soils of coastal sedimentary plains. These savannas vary from having a dense, tall grass cover with scattered trees to forming a shrub savanna with dense thickets interrupted by open spaces with sparse herbaceous vegetation. Diagnostic are *Kielmeyera* sp., Cactaceae, and Bromeliaceae. In the south, this type includes xeric shrublands dominated by columnar cacti found on the Buzios Peninsula and Cabo Frio Island in southeastern Brazil.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Ed. Brazilian-Parana Lowland Grassland, Savanna & Shrubland (D126)

Elcode: M684

\*Scientific Name: Brazilian Atlantic Coastal Plain Savanna & Woodland Macrogroup

\*Common (Translated Scientific) Name: Brazilian Atlantic Coastal Plain Savanna & Woodland Macrogroup

\*Colloquial Name: Brazilian Atlantic Coastal Plain Savanna & Woodland

\*Type Concept: The macrogroup includes savanna vegetation that occurs on sandy soils of the coastal plains of Brazil. In the north it corresponds to savanna enclaves that develop on the deeper sandy soils of coastal sedimentary plains. The savanna vegetation ranges from a dense, tall grass cover with scattered trees, to a shrub savanna with dense thickets interrupted by open spaces where herbaceous vegetation is relatively sparse. Diagnostic for this macrogroup are *Kielmeyera* sp., Cactaceae, and Bromeliaceae. Farther south on the coast, the macrogroup includes the xeric shrublands dominated by columnar cacti found in the peninsula of Buzios and Cabo Frio Island in southeastern Brazil. The particularly dry climate of the peninsula allows the development of this community, especially in the hills facing towards the ocean.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M351 Cerrado Shrubland & Savanna Macrogroup | M351 reconfigured into M684, M685, M686, M688, M727 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.1.Ed. Brazilian-Parana Lowland Grassland, Savanna & Shrubland

M688. Parana Upland Savanna & Shrubland

Type Concept Sentence: Savannas that grow on sandstone soils derived from the Misiones Formation and its colluvial deposits in the Misiones area of Argentina. Also occurs in adjacent Uruguay, where sandy soils result from the accumulation of sediments carried by the Uruguay River. The composition varies but generally includes savannas with a dense grass cover and varying levels of woody coverage. Along the plains of the Uruguay River, these savannas are often dominated by palm groves of *Butia yatay* in Uruguay and by *Acrocomia totai* in Paraguay. Characteristic accompanying species are *Andropogon bicornis, Cochlospermum regium, Magonia pubescens, Peltophorum dubium, Schizachyrium condensatum*, and *Setaria parviflora*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Ed. Brazilian-Parana Lowland Grassland, Savanna & Shrubland (D126)

Elcode: M688

\*Scientific Name: Parana Upland Savanna & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Parana Upland Savanna & Shrubland Macrogroup

\*Colloquial Name: Parana Upland Savanna & Shrubland

\*Type Concept: These group of savannas are associated with soils derived from sandstones of the Misiones Formation, east of Paraguay in the southern limit of the Cerrado with the Alto parana and the colluvial deposits of this formation in the Misiones area of Argentina and adjacent Uruguay, where sandy soils are typical from the accumulation of sediments carried by the Uruguay River. Depending on their location, the composition may vary, but in general, it includes savannas with a well-developed grass stratum and varying levels of woody coverage. Along the plains of the Uruguay River, they are often dominated by palm groves of *Butia yatay*, and by *Acrocomia totai* in Paraguay. Accompanying species are *Schizachyrium condensatum, Setaria parviflora, Rhynchelitrum repens, Fimbristylis complanata, Andropogon bicornis, Cenchrus echinatus, Digitaria insularis, Panicum laxum, Panicum pernambucense*, and *Bulbostylis capillaris*, and among the woody species are *Solanum sisymbrifolium, Cochlospermum regium, Magonia pubescens, Caryocar brasiliense, Luehea grandiflora, Gochnatia polymorpha, Isostigma riedelii, Vernonia bardanioides, Eupatorium variegatum, Gochnatia barrosii, Annona dioica, Duguetia furfuracea, Butia paraguayensis, Attalea guaranitica, Peltophorum dubium, Allagoptera leucocalyx, Helietta apiculata, Byrsonima* spp., and *Curatella* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, PY, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M351 Cerrado Shrubland & Savanna Macrogroup | M351 reconfigured into M684, M685, M686, M688, M727 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.1.Ed. Brazilian-Parana Lowland Grassland, Savanna & Shrubland

M685. Cerrado Savanna

Type Concept Sentence: A variety of savannas of the Cerrado biogeographic region in Brazil and Bolivia, which are distributed in the extensive plateau of the Brazilian Shield and range from 400 to 1700 m elevation. The poor soils on which these savannas occur are made up of quartzitic sands, sandstones, and gravel that are products of the weathering of laterite deposits. The climate is seasonal and tropical, with annual precipitation ranging from 1200-2000 mm. The savanna types cover a wide range of physiognomies from open grasslands to a densely treed savanna locally called "cerrado," all of which are strongly influenced by fire regimes. These are the most extensive and floristically diverse savannas in South America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Ed. Brazilian-Parana Lowland Grassland, Savanna & Shrubland (D126)

Elcode: M685

\*Scientific Name: Cerrado Savanna Macrogroup

\*Common (Translated Scientific) Name: Cerrado Savanna Macrogroup

\*Colloquial Name: Cerrado Savanna

\*Type Concept: The macrogroup includes the different types of savannas of the Cerrado biogeographic region in Brazil and Bolivia, which are distributed in the extensive plateau of the Brazilian Shield that covers a significant portion of central Brazil south of the Amazon Basin and extends to the southeastern corner of Bolivia. The nutrient-poor soils to which these savannas are associated include quartzitic sands, sandstones, and gravels that are the product of the weathering of the laterite deposits that formed on top of the ancient rocks of the shield. The elevation ranges between 400 and 1700 m, the climate is tropical seasonal and total precipitation amounts are between 1200 and 2000 mm. The savanna types cover a wide range of physiognomies from open grasslands to a densely treed savanna locally called "cerrado." To some extent these savanna types are related to nutrient and moisture availability, but fire succession dynamics also play a role in the distribution of these types at any given time. These are the most extensive savannas in South America and also the most diverse and endemic in floristic composition. Among grass/herb genera, *Burmannia, Rhynchospora, Drosera, Cipura, Digitaria, Sisyrinchium, Utricularia, Cuphea, Cleistes, Habenaria, Sarcoglottis, Aristida, Axonopus, Panicum, Mesosetum, Paspalum, Trachypogon*, and *Imperata* are common. Diagnostic cerrado woody species are *Qualea parviflora, Qualea grandiflora, Qualea multiflora, Kielmeyera coriacea, Byrsonima coccolobifolia, Byrsonima verbasifolia, Bowdichia virgilioides, Curatella americana, Connarus suberosus, Caryocar brasiliense, Astronium fraxinifolium, Annona crassiflora, Brosimum gaudichaudii, Acosmium dasycarpum, Hymenaea stigonocarpa, Erythroxylum suberosum, Hancornia speciosa, Lafoensia pacari, Machaerium acutifolium, Pouteria ramiflora, Roupala montana, Tabebuia aurea, Tabebuia ochracea, Couepia grandiflora, Terminalia brasiliensis, Rourea induta, Diospyros hispida, Byrsonima crassa, Anacardium occidentale, Vochysia elliptica, Vatairea macrocarpa, Terminalia argentea, Sclerolobium aureum, Syagrus comosa, Vochysia rufa*, among many others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-09-10 | M350 Chiquitania & Beni Upland Shrubland & Savanna Macrogroup | M686 & M350 merged into M685 |
| 2013-09-10 | M686 Cerrado Upland Shrubland & Savanna Macrogroup | M686 & M350 merged into M685 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.1.Er. Colombian-Venezuelan Lowland Grassland, Savanna & Shrubland

D249. Colombian-Venezuelan Lowland Grassland, Savanna & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.1.Er. Tropical Lowland Grassland, Savanna & Shrubland (F019)

Elcode: D249

\*Scientific Name: Colombian-Venezuelan Lowland Grassland, Savanna & Shrubland Division

\*Common (Translated Scientific) Name: Colombian-Venezuelan Lowland Grassland, Savanna & Shrubland Division

\*Colloquial Name: Colombian-Venezuelan Lowland Grassland, Savanna & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M676 | Llanos Upland Savanna |
| M675 | Guajiran Ruderal Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.1.Er. Colombian-Venezuelan Lowland Grassland, Savanna & Shrubland

M676. Llanos Upland Savanna

Type Concept Sentence: Upland open to treed savannas of the Orinoquian Llanos of Colombia and Venezuela. Open savannas develop in flat areas with superficial laterite soils, while treed savannas tend to grow on sandy clay soils with higher soil permeability, or on colluvial deposits. Other settings include well-drained mesas with acidic, nutrient-poor soils. The climate is seasonal with a prolonged dry period. Woody savannas have one to two woody strata but always a dense herbaceous understory. Characteristic herbaceous species include *Andropogon selloanus, Axonopus canescens, Bulbostylis* spp., *Leptocoryphium lanatum, Paspalum carinatum*, and *Trachypogon vestitus*. Characteristic woody species include *Byrsonima crassifolia, Cassia moschata, Copaifera officinalis, Curatella americana, Genipa americana, Godmania macrocarpa*, and *Xilopia aromatica*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Er. Colombian-Venezuelan Lowland Grassland, Savanna & Shrubland (D249)

Elcode: M676

\*Scientific Name: Llanos Non-flooded Savanna Macrogroup

\*Common (Translated Scientific) Name: Llanos Non-flooded Savanna Macrogroup

\*Colloquial Name: Llanos Upland Savanna

\*Type Concept: This macrogroup includes upland open to wooded savannas distributed in the Orinoquian Llanos of Colombia and Venezuela. Open savannas develop in flat areas with surficial laterite soils, while wooded savannas tend to grow on medium to deep sandy clay soils with an incipient drainage network due to high soil permeability, or on the colluvial deposits at the base of higher terrain called "mesas." Other settings include the lower foothills of the eastern Andes and well-drained mesas with varied types of soils (quartzitic sands, Oxisols, Alfisols, Ultisols, Inceptisols) but generally very poor in nutrients (oligotrophic) and quite acidic. In these savannas the seasonality and topography include a season with moisture availability, followed by a more-or-less prolonged dry period. In woody savannas there are one to two woody strata but always with a dense herbaceous stratum. The following list of species is diagnostic for this macrogroup. Herbaceous: *Trachypogon vestitus, Trachypogon* spp., *Axonopus canescens, Leptocoryphium lanatum, Andropogon selloanus, Paspalum carinatum, Bulbostylis stenocarpa (= Bulbostylis junciformis), Bulbostylis capillaris, Bulbostylis conifera, Cyperus falvus*. Woody species: *Curatella americana, Byrsonima crassifolia, Cassia moschata, Copaifera officinalis, Xilopia aromatica, Godmania macrocarpa*, and *Genipa americana (= Genipa caruto)*. Open forests components: *Copaifera pubiflora, Hymenaea courbaril, Cassia moschata, Lonchocarpus ernestii, Luehea candida, Pterocarpus podocarpus, Fagara pterota, Vochysia venezuelana, Cochlospermum vitifolium, Xilopia aromatica, Vitex appuni, Connarus venezuelensis, Jacaranda obtusifolia, Chomelia spinosa*, and *Erythroxylum orinocense*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M344 Orinoquian Savanna Macrogroup | M344 reconfigured into M676 & part of M565 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.1.Es. Guianan Lowland & Upland Grassland, Savanna & Shrubland

D250. Guianan Lowland & Upland Grassland, Savanna & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.1.Es. Tropical Lowland Grassland, Savanna & Shrubland (F019)

Elcode: D250

\*Scientific Name: Guianan Lowland & Upland Grassland, Savanna & Shrubland Division

\*Common (Translated Scientific) Name: Guianan Lowland & Upland Grassland, Savanna & Shrubland Division

\*Colloquial Name: Guianan Lowland & Upland Grassland, Savanna & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO, GF, GY, SV, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M681 | Eastern Guianan Savanna & Shrubland |
| M679 | Central Guianan Savanna & Shrubland |
| M680 | Western Guianan Savanna& Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-13 | D125 Guyanan Shrubland & Savanna Division | D125 replaced by D250 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.1.Es. Guianan Lowland & Upland Grassland, Savanna & Shrubland

M681. Eastern Guianan Savanna & Shrubland

Type Concept Sentence: Savannas that develop mostly on sandy soils that originate from marine deposits along the coastal plain of Guyana, French Guiana and Surinam. Savannas growing on shallow soils on lateritic hardpans are the lowest stature and have the lowest species richness, whereas those occurring on ferralitic-clayish, deeper soils have a continuous coverage of grass tussocks that may have interspersed clusters of woody species up to 5 m high. Climate in all cases is humid. Diagnostic species are *Axonopus aureus, Borreria hispida, Bulbostylis capillaris, Byrsonima coccolobifolia, Curatella americana, Lagenocarpus tremulus, Leptocoryphium lanatum, Palicourea rigida, Panicum micranthum, Paspalum pulchellum, Rhynchospora barbata, Schizachyrium riedelii, Scleria pyramidalis, Sebastiana corniculata, Tibouchina aspera*, and *Trachypogon plumosus*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Es. Guianan Lowland & Upland Grassland, Savanna & Shrubland (D250)

Elcode: M681

\*Scientific Name: Eastern Guianan Savanna & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Eastern Guianan Savanna & Shrubland Macrogroup

\*Colloquial Name: Eastern Guianan Savanna & Shrubland

\*Type Concept: These are savannas developed mostly on sandy soils originated in marine deposits along the coastal plain of Guyana, French Guiana and Surinam. Those growing on shallow soils on lateritic hardpans are the shortest, most species-poor and with sparsest coverage, while those developed on ferralitic-clayish, deeper soils have a continuous grass coverage of grass tussocks which may or may not have dispersed clusters of woody species up to 5 m high. Climate in all cases is humid. Diagnostic species are *Rhynchospora barbata, Rhynchospora* spp., *Leptocoryphium lanatum, Axonopus aureus, Panicum micranthum, Scleria pyramidalis, Lagenocarpus tremulus, Paspalum pulchellum, Trachypogon plumosus, Schizachyrium riedelii, Bulbostylis capillaris, Borreria hispida, Sebastiana corniculata, Palicourea rigida, Clidemia rubra, Curatella americana, Byrsonima coccolobifolia*, and *Tibouchina aspera*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: GF, GY, SR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-13 | M348 Eastern Guyana Shrubland & Savanna Macrogroup | M348 replaced by M681 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.1.Es. Guianan Lowland & Upland Grassland, Savanna & Shrubland

M679. Central Guianan Savanna & Shrubland

Type Concept Sentence: Upland savannas developing under different topographic and edaphic conditions. On the flat plains of the Gran Sabana in Venezuela, Brazil and Guyana, these savannas form on clayish or lateritic soils and are subject to frequent fires. The grass cover is 1-1.5 m tall with 20-70% coverage, and dominant species are of the genera *Trachypogon, Bulbostylis*, and *Axonopus*. These savannas also develop on the mostly sandy slopes of the Guiana Shield or of the tepuis. The composition and proportions of herbaceous versus shrubby elements vary depending on nutrient and moisture conditions. Shrub species include *Bonnetia sessilis, Bonyunia minor, Cyrilla racemiflora, Euphronia guianensis*, and *Ouratea roraimae*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Es. Guianan Lowland & Upland Grassland, Savanna & Shrubland (D250)

Elcode: M679

\*Scientific Name: Central Guianan Savanna & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Central Guianan Savanna & Shrubland Macrogroup

\*Colloquial Name: Central Guianan Savanna & Shrubland

\*Type Concept: Upland savannas that develop under different topographic and edaphic conditions. On the flat plains of the Gran Sabana in Venezuela, Brazil and Guyana, on clayish or lateritic soils and subjected to frequent fire dynamics, natural or anthropogenic. The grass layer is 1-1.5 m tall with 20-70% coverage; dominant species are of the genera *Trachypogon, Bulbostylis*, and *Axonopus*. In other circumstances they develop on the mostly sandy slopes of the Guiana Shield or of the massifs (tepuys). The composition and proportions of herbaceous versus shrubby elements can vary depending on nutrient and moisture availability conditions at their location. Diagnostic species are *Euphronia guianensis, Bonyunia minor, Miconia* spp., *Trattinnickia burserifolia, Palicourea rigida, Bonnetia sessilis, Calea divaricata, Ochthocosmus* sp., *Ouratea roraimae, Cyrilla racemiflora (= Cyrilla antillana), Tetrapterys* sp., *Licania incana, Tococa nitens, Brocchinia reducta, Stegolepis*, and *Scleria* sp., many of them endemic.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, GY, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-09-10 | M678 Central Guianan Open Savanna Macrogroup | M678 merged into M679 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.1.Es. Guianan Lowland & Upland Grassland, Savanna & Shrubland

M680. Western Guianan Savanna& Shrubland

Type Concept Sentence: Savannas occurring in hilly terrain and valleys south of the upper and middle Orinoco River in Colombia and Venezuela. In Colombia they grow on the westernmost transition zone between the western Guiana Shield and the Amazon on ancient sandstone tablelands 400 m high on average, such as those of the Serrania de Chiribiquete and Araracuara. The climate is humid but seasonal. Dominants in the herbaceous layer are species of the genera *Trachypogon* and *Axonopus*, and there is a more-or-less closed shrub layer 2-4 m high. In topographic depressions with a higher water table, dense shrublands up to 7 m tall can develop with the presence of palms and an important biomass of epiphytes.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.1.Es. Guianan Lowland & Upland Grassland, Savanna & Shrubland (D250)

Elcode: M680

\*Scientific Name: Western Guianan Savanna & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Western Guianan Savanna & Shrubland Macrogroup

\*Colloquial Name: Western Guianan Savanna& Shrubland

\*Type Concept: Savannas occurring on peneplains, hilly terrain and valleys, south of the upper and middle Orinoco River in Colombia and Venezuela. They grow both on Oxisols with ferruginous gravels, and in Colombia, on the westernmost transition zone between the western Guiana Shield and the Amazon, on ancient sandstone tablelands of 400 m elevation on average, like those of the Serrania de Chiribiquete and Araracuara and also where other sandstone horizontal strata outcrop. The climate is humid but seasonal. Dominants in the herbaceous layer are species of *Trachypogon* and *Axonopus*, and there is a more-or-less closed shrub layer 2-4 m high. In topographic depressions with a higher water table, dense shrublands up to 7 m tall can develop with presence of palms and an important biomass of epiphytes. Fires are the main drivers of the dynamics of these systems. Diagnostic species are *Trachypogon plumosus, Axonopus canescens, Andropogon* spp., *Aristida* spp., *Thrasya petrosa, Bulbostylis* spp., *Scleria cyperina, Galactia, Chamaecrista, Eriosema, Krameria ixine, Curatella americana, Byrsonima crassifolia, Byrsonima coccolobifolia, Palicourea rigida, Roupala montana, Acrocomia aculeata*. Variants: *Attalea* sp., *Caraipa llanorum, Bowdichia virgilioides, Platycarpum orinocense, Casearia javitensis, Psidium salutare, Protium heptaphyllum*, and also members of the Xyridaceae and Rapataceae.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M347 Western Guyana Shrubland & Savanna Macrogroup | M347 replaced by M680 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2.A.2. Tropical Montane Grassland & Shrubland

Tropical Montane Grassland & Shrubland is dominated by shrubs and herbs with mesomorphic growth forms (predominantly tussock grasses, large rosette plants, shrubs with evergreen coriaceous and sclerophyllous-*ericoid* leaves, and cushion plants).

2. Shrub & Herb Vegetation

2.A.2.Ea. Tropical Andean Grassland & Shrubland

D134. Tropical Andean Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.2.Ea. Tropical Montane Grassland & Shrubland (F017)

Elcode: D134

\*Scientific Name: Tropical Andean Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Tropical Andean Grassland & Shrubland Division

\*Colloquial Name: Tropical Andean Grassland & Shrubland

\*Type Concept: Species-rich, moist grasslands and shrublands, above 3300 m elevation in the northern and central Andes. Tussock grassland up to 0.6 m tall, frequently with interspersed short to mid-tall shrubs, rosette forbs and cushion-forming plants.

Range: Corresponds to the "alpine vegetation" belt of the Andes; from the Venezuelan Andes southward into the central Bolivian high plateau (Altiplano).

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M377 | Bolivian-Tucuman Montane Grassland & Shrubland |
| M696 | Central Andean (Yungas) Upper Montane Grassland & Shrubland |
| M375 | Northern Andean Montane & Upper Montane Grassland & Shrubland |
| M378 | Moist Puna Grassland & Scrub |
| M694 | Northern Andean Paramo |
| M697 | Andean Montane & Upper Montane Ruderal Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.Ea. Tropical Andean Grassland & Shrubland

M377. Bolivian-Tucuman Montane Grassland & Shrubland

Type Concept Sentence: Grasslands and shrublands that occur naturally on upper Andean slopes, usually above the treeline. Can also occur in small patches at lower elevations (2000-3000 m) as seral stages after the occurrence of landslides or other types of natural disturbance. In situations of anthropogenic disturbance, this vegetation type forms the natural hedges between agricultural fields and the vegetation that grows along creeks and ravines. Occurs in the eastern montane forest zone of southern Bolivia and northern Argentina, where climates range from humid to seasonally dry.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.2.Ea. Tropical Andean Grassland & Shrubland (D134)

Elcode: M377

\*Scientific Name: Bolivian-Tucuman Montane Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Bolivian-Tucuman Montane Grassland & Shrubland Macrogroup

\*Colloquial Name: Bolivian-Tucuman Montane Grassland & Shrubland

\*Type Concept: Grasslands and shrublands are natural communities in the upper portions of the Andean slopes, usually above the treeline; however, they can also occur in small patches at lower elevations (2000-3000 m) as seral stages after the occurrence of landslides or other type of natural disturbance. Some of the species of these assemblages are also the ones that form communities on sites with stony, shallow soils. In situations of anthropogenic disturbance, they also tend to form the natural hedges among agricultural fields and the vegetation that grows on creeks and ravines. This macrogroup represents the plant communities in these varied situations, growing from 1200 to approximately 3800 m in the eastern montane forest zone of southern Bolivia and northern Argentina, with climates from humid to seasonally dry. At higher altitudes on poor substrates they are dominated by bunchgrasses *Deyeuxia calderillensis, Deyeuxia fiebrigii, Deyeuxia hieronymi, Festuca boliviana, Festuca dolichophylla, Festuca fiebrigii, Festuca hieronymi*. At lower elevations, open shrublands associated with forbs and grasses include *Chusquea lorentziana, Rubus bolivianus, Vassobia brevifolia, Myrsine coriacea, Croton densiflorus*, and in warmer valleys they include *Bocconia pearcei, Tecoma stans, Acacia aroma, Cestrum albotomentosum, Adenaria floribunda, Senna spectabilis, Verbesina alophylla, Myrsine coriacea*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.Ea. Tropical Andean Grassland & Shrubland

M696. Central Andean (Yungas) Upper Montane Grassland & Shrubland

Type Concept Sentence: Grasslands and shrublands growing in the high Andes in Peru and Bolivia, mostly on the humid eastern slopes, from 3000-4200 m elevation. Composed of dense tussock grasslands with a variety of shrubs. Shrub associations occupy the ecotonal edges of the upper limit of montane forest, whereas grasslands with scattered short scrubs occupy large areas in the landscape where the herbaceous component is the matrix. The following genera are characteristic: *Arcytophyllum, Blechnum, Brachyotum, Calamagrostis, Cortaderia, Diplostephium, Eriocaulon, Festuca, Gaultheria, Gentiana, Gentianella, Huperzia, Hypericum, Jamesonia, Loricaria, Melpomene, Miconia, Neurolepis, Paepalanthus, Pernettya, Stipa, Vaccinium*, and *Werneria*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.2.Ea. Tropical Andean Grassland & Shrubland (D134)

Elcode: M696

\*Scientific Name: Central Andean (Yungas) Upper Montane Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Central Andean (Yungas) Upper Montane Grassland & Shrubland Macrogroup

\*Colloquial Name: Central Andean (Yungas) Upper Montane Grassland & Shrubland

\*Type Concept: This macrogroup represents the grasslands and shrublands growing in the high Andes from Peru and Bolivia, mostly on the humid eastern slopes, from 3000-4200 m elevation. They are formed by dense tussock grasses, and a variety of bushes and shrubs. Shrub associations are often found bordering the upper limit of montane forest forming an ecotonal area, while grassland with scattered short scrub occupy large areas in the landscape, where the herbaceous component is the matrix. This vegetation occurs in a complex mosaic with hygrophilous grasslands, wetlands and peatlands, also with rocky outcrops covered by saxicolous communities, and riparian systems, all these with a generally very localized spatial expression. Diagnostic genera for this macrogroup are *Cortaderia, Neurolepis, Calamagrostis (= Deyeuxia), Gentiana, Gentianella, Eriocaulon, Paepalanthus, Melpomene, Festuca, Stipa, Huperzia, Jamesonia, Werneria, Blechnum, Pernettya, Gaultheria, Miconia, Loricaria, Diplostephium, Xyris, Hypericum, Arcytophyllum, Brachyotum, Aulonemia, Ripidocladium*, and *Vaccinium*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M376 Yungas Upper Montane Grassland & Shrubland Macrogroup | M376 replaced by M696 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.Ea. Tropical Andean Grassland & Shrubland

M375. Northern Andean Montane & Upper Montane Grassland & Shrubland

Type Concept Sentence: Vegetation communities occurring over relatively small areas on plateaus and cliffs formed on sandstone outcrops in sub-Andean cordilleras. Known occurrences are from southeast Ecuador and northeast Peru, in the Cordillera del Condor at approximately 2000-2400 m elevation, in areas with very high precipitation that, due to soils and topography, become saturated for long periods. Vegetation is a mix of tall sclerophyllous herbaceous plants like bromeliads and orchids growing on the ground, and sclerophyllous shrublands with abundant epiphytes and hemi-epiphytes growing on a thick mat of organic matter.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.2.Ea. Tropical Andean Grassland & Shrubland (D134)

Elcode: M375

\*Scientific Name: Northern Andean Montane & Upper Montane Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Northern Andean Montane & Upper Montane Grassland & Shrubland Macrogroup

\*Colloquial Name: Northern Andean Montane & Upper Montane Grassland & Shrubland

\*Type Concept: These are vegetation communities occurring over relatively small areas on plateaus and cliffs formed on sandstone outcrops in sub-Andean cordilleras. Known occurrences are from southeast Ecuador and northeast Peru, in the Cordillera del Condor at around 2000-2400 m elevation, in places with very high precipitation that, due to soils and topography, become saturated for long periods. Vegetation is a mix of tall sclerophyllous herbaceous plants like bromeliads and orchids growing on the ground, and sclerophyllous shrublands with abundant epiphytes and hemi-epiphytes, both growing on a thick mat of organic matter. The following list of species is diagnostic for this macrogroup: *Paepalanthus ensifolius, Pseudonoseris chachapoyensis, Sphaeradenia* sp., *Stenospermation robustum, Clusia cff. eliptica, Clusia ducuoides, Purdiaea nutans, Xyris uleana, Gaultheria* spp., *Disterigma acuminatum, Vaccinium floribundum, Hedyosmum* sp., *Ilex microphyllum, Myrteola phylicoides, Ugni myricoides, Myrcianthes fragrans, Weinmannia fagaroides, Schefflera moyobambae, Schefflera* spp., *Piper* sp., *Palicourea* sp., *Cybianthus* sp., *Drimys cf. granadensis, Miconia noriifolia, Persea* sp., *Brachyotum campanulare, Symplocos* sp., *Ternstroemia jelskii, Epidendrum dermatanthum, Epidendrum secundum, Epidendrum alsum, Epidendrum mancum, Elleanthus lancifolius, Elleanthus aff. linifolius, Maxillaria* spp., *Odontogrlossum* sp., *Pleurothallis* sp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M723 Eastern Subandean Ridge Wet Meadow Macrogroup | M723 concept covered under M375 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.Ea. Tropical Andean Grassland & Shrubland

M378. Moist Puna Grassland & Scrub

Type Concept Sentence: Vegetation dominated by tussock grasslands intermingled with shrubs at 3000-4000 m elevation, resulting from continued alteration of short-statured, semi-dense *Polylepis*-dominated forests that characterize the ecotone between Andean forests and Puna grasslands in Peru and Bolivia, especially on the eastern slopes of the Andes. These grasslands are characterized by *Calceolaria* spp., *Deyeuxia* spp., *Festuca dolichophylla, Mutisia* spp., *Poa asperiflora, Satureja boliviana, Stipa ichu, Stipa inconspicua*, and *Stipa obtusa*, with varying proportions of short, usually microfoliate and resinous shrubs of the genera *Baccharis* and *Eupatorium*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.2.Ea. Tropical Andean Grassland & Shrubland (D134)

Elcode: M378

\*Scientific Name: Moist Puna Grassland & Scrub Macrogroup

\*Common (Translated Scientific) Name: Moist Puna Grassland & Scrub Macrogroup

\*Colloquial Name: Moist Puna Grassland & Scrub

\*Type Concept: In the elevation belt between 3000-4000 m asl, it is common that this vegetation dominated by tussock grasslands intermingled with shrubs is the result of continued alteration of short-statured, semi-dense *Polylepis*-dominated forests that characterize the ecotone between the timberline of the Andean forests and Puna grasslands in Peru and Bolivia, especially on the eastern slopes of the Andes. These grasslands are characterized by *Calceolaria* spp., *Deyeuxia* spp., *Festuca dolichophylla, Mutisia* spp., *Poa asperiflora, Satureja boliviana, Stipa ichu, Stipa inconspicua*, and *Stipa obtusa*, with varying proportions of short, usually microfoliate and resinous shrubs of the genera *Baccharis* and *Eupatorium*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.Ea. Tropical Andean Grassland & Shrubland

M694. Northern Andean Paramo

Type Concept Sentence: Grasslands and shrublands characteristic of the Andean highlands in Venezuela, Colombia, Ecuador, and northern Peru. They grow above the timberline, from 3000-3500 m elevation up to the snowline. The climate is humid to very humid, with major temperature differences occurring diurnally rather than seasonally. Nights are characterized by freezing temperatures. Because of their high-elevation distribution, they occur as habitat islands on mountains, isolated by forested vegetation growing at lower elevations. Main components are tussock grasses of the genera *Festuca, Calamagrostis*, and *Carex*. Interspersed is a rich diversity of ferns, herbs, and shrubs, some of which form cushions and rosettes such as members of the genera *Espeletia* and *Puya*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.2.Ea. Tropical Andean Grassland & Shrubland (D134)

Elcode: M694

\*Scientific Name: Northern Andean Paramo Macrogroup

\*Common (Translated Scientific) Name: Northern Andean Paramo Macrogroup

\*Colloquial Name: Northern Andean Paramo

\*Type Concept: This macrogroup includes several grasslands and shrublands characteristic of the Andean highlands in Venezuela, Colombia, Ecuador and the very north of Peru. These grasslands normally grow above the timberline (ca. 3000-3500 m elevation) and up to the snowline. In most cases, the climatic conditions are humid to very humid, and the main differences in temperature happen during the day rather than seasonally, with near or below freezing temperatures at night. Because of their distribution, they occur as islands in the upper parts of the mountains, separated by the forested vegetation that grows downwards. The main component are tussock and bunchgrasses of the genera *Festuca, Calamagrostis*, and *Carex*, with almost 100% cover. Interspersed among them are a rich diversity of ferns and herbaceous species, some of them forming cushions. Due to the isolated distribution of the paramos, they host significant numbers of restricted endemic plant species. Other dominant elements are giant rosette plants from the genera *Espeletia* and *Puya*. Shrubs are also an important component, especially in paramos not frequently subjected to burning; their heights vary between 0.5-2 m. Among the common shrub genera are *Hypericum, Loricaria, Bejaria, Brachyotum, Diplostephium, Miconia, Espeletia, Espeletiopsis*, and *Ageratina*. Dominant families include Asteraceae, Fabaceae, Ericaceae, and Apiaceae. This vegetation occurs in a complex mosaic with hygrophilous grasslands, wetlands and peatlands, also with rocky outcrops covered by saxicolous communities, and riparian systems, all these with a generally very localized spatial expression.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M374 Andean Paramo Upper Montane Grassland & Shrubland Macrogroup | M374 replaced by M694 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.Eb. Caribbean-Mesoamerican Montane & High Montane Grassland & Shrubland

D135. Caribbean-Mesoamerican Montane & High Montane Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.2.Eb. Tropical Montane Grassland & Shrubland (F017)

Elcode: D135

\*Scientific Name: Caribbean-Mesoamerican Montane & High Montane Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Caribbean-Mesoamerican Montane & High Montane Grassland & Shrubland Division

\*Colloquial Name: Caribbean-Mesoamerican Montane & High Montane Grassland & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D043 | Western North American Alpine Tundra |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CR, MX, PA, PR?

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low - Poorly Documented

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M689 | Caribbean Montane Shrubland & Grassland |
| M691 | Mesoamerican Montane Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.Eb. Caribbean-Mesoamerican Montane & High Montane Grassland & Shrubland

M691. Mesoamerican Montane Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.2.Eb. Caribbean-Mesoamerican Montane & High Montane Grassland & Shrubland (D135)

Elcode: M691

\*Scientific Name: Mesoamerican Montane Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Mesoamerican Montane Grassland & Shrubland Macrogroup

\*Colloquial Name: Mesoamerican Montane Grassland & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CR, MX, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G817 | Madrean Alpine Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-04 | M381 Central American Montane Shrubland & Grassland Macrogroup | M381 split into M690 & M691 (north & south); subsequently it was determined that M690 concept covered by G817 in M691 (DFL 8-28-13). |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.Ek. Guianan Montane Grassland & Shrubland

D252. Guianan Montane Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.2.Ek. Tropical Montane Grassland & Shrubland (F017)

Elcode: D252

\*Scientific Name: Guianan Montane Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Guianan Montane Grassland & Shrubland Division

\*Colloquial Name: Guianan Montane Grassland & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, GY, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M693 | Tepuyan Mesic Grass & Forb Meadow |
| M692 | Tepuyan Sclerophyllous Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | D136 Guyanan Montane Shrubland & Grassland Division | D136 replaced by D252 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.Ek. Guianan Montane Grassland & Shrubland

M693. Tepuyan Mesic Grass & Forb Meadow

Type Concept Sentence: Different types of meadow with a shrub component. The herbaceous stratum is formed by broadleaf forbs, tubiform or with rosette-like leaves. The woody component may be dominated by low shrubs and subshrubs. Different substrates and elevations support different communities. These occur on peaks, plateaus, and slopes of the tepuis and hills across the Guiana Shield in Venezuela, between 750-2750 m elevation. The substrate may be rocky, usually with sandstone outcrops, or consisting of peat or organic matter in flat plateaus. The climate is hyper-humid. Diagnostic species are *Everardia montana, Navia ovoidea, Orectanthe sceptrum*, and several species of *Brocchinia, Mabea, Stegolepis*, and *Xyris*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.2.Ek. Guianan Montane Grassland & Shrubland (D252)

Elcode: M693

\*Scientific Name: Tepuyan Mesic Grass & Forb Meadow Macrogroup

\*Common (Translated Scientific) Name: Tepuyan Mesic Grass & Forb Meadow Macrogroup

\*Colloquial Name: Tepuyan Mesic Grass & Forb Meadow

\*Type Concept: Different types of meadow or dense non-graminoid "grassland" with a shrub component. The woody component may be dominated by low shrubs and subshrubs. The herbaceous component is formed by broadleaf forbs, tubiform or with rosette-like leaves, usually sclerophyllous. Different substrates and elevations support different communities. These occur on peaks, plateaus and slopes of the tepuys and hills across the Guiana Shield in Venezuela, between 750-2750 m asl. The substrate may be rocky, usually with sandstone outcrops, or consisting of peat or organic matter in flat plateaus. It has a hyper-humid climate. Diagnostic species for this macrogroup are *Stegolepis* spp., *Navia ovoidea, Brocchinia* spp., *Everardia montana, Orectanthe sceptrum, Abolboda* spp., *Xyris* spp., *Nietneria corymbosa, Kunhardtia rhodantha, Saxofridericia* spp., *Philodendron englerianum, Heliamphora tatei, Bonnetia* spp., *Celianella* spp., *Terminalia quintalata, Stenopadus jauaensis, Ledothamnus jauaensis, Tibouchina* spp., *Mabea* spp., *Duidania* spp., *Cyrilla* spp., and *Ilex* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, GY, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M383 Pantepui Montane Shrubland & Grassland Macrogroup | M383 replaced by M693 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.Ek. Guianan Montane Grassland & Shrubland

M692. Tepuyan Sclerophyllous Shrubland

Type Concept Sentence: Sclerophyllous shrublands distributed from lower montane portions of the Guianan tepuis at 400-500 m elevation up to the flat tops of table mountains at 2000 m. These are dense shrublands 0.5-3 m-high, interspersed with herbaceous vegetation with a predominance of rosette forms. Where they occur on slopes, they grow on sandstone outcrops. On the tops of the tepuis, there can be peat accumulation in the substrate. Lower elevations shrublands are characterized by *Dacryodes microcarpa, Platycarpum rhododactylum, Terminalia quintalata*, and *Vellozia tubiflora*, whereas *Bonnetia jauaensis, Gongylolepis pedunculata, Maguireothamnus jauaensis*, and *Tyleria breweri* are common on the high, flat tepuy tops.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.2.Ek. Guianan Montane Grassland & Shrubland (D252)

Elcode: M692

\*Scientific Name: Tepuyan Sclerophyllous Shrubland Macrogroup

\*Common (Translated Scientific) Name: Tepuyan Sclerophyllous Shrubland Macrogroup

\*Colloquial Name: Tepuyan Sclerophyllous Shrubland

\*Type Concept: The macrogroup represents the sclerophyllous shrublands distributed from lower montane positions at the base of the Guianan tepuys at 400-500 m elevation up to those growing on the flat top of the table mountains at 2000 m asl. These are dense, short 0.5-3 m high shrublands, interspersed by herbaceous vegetation with a predominance of rosette forms. When occurring on slope positions, they grow on sandstone outcrops, but on the top of the tepuis, there can be peat accumulation in the substrate. Lower elevations are characterized by *Platycarpum rhododactylum, Terminalia quintalata, Dacryodes microcarpa, Licania* spp., *Caraipa* spp., *Bonnetia sessilis, Ternstroemia pungens, Humiria balsamifera, Blepharandra fimbriata, Ruizterania ferruginea, Ilex retusa, Taralea crassifolia, Vellozia tubiflora, Bonnetia lanceifolia, Stomatochaeta cylindrica, Stenopadus colveii*, and *Marlierea pudica*. Diagnostic species of the higher tepui peaks are *Bonnetia jauaensis, Gongylolepis pedunculata, Gongylolepis jauaensis, Stenopadus jauaensis, Maguireothamnus jauaensis, Tyleria breweri*, and *Blepharandra hypoleuca*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR?, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-04-24 | M382 Guyanan Montane Shrubland & Grassland Macrogroup | M382 split into M692 & M693 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.El. Brazilian-Parana Montane Grassland & Shrubland

D253. Brazilian-Parana Montane Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.2.El. Tropical Montane Grassland & Shrubland (F017)

Elcode: D253

\*Scientific Name: Brazilian-Parana Montane Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Brazilian-Parana Montane Grassland & Shrubland Division

\*Colloquial Name: Brazilian-Parana Montane Grassland & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M699 | Brazilian-Parana Montane Grassland, Savanna & Forb Meadow |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | D137 Parana Brazilian Montane Shrubland & Savanna Division | D137 replaced by D253 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.2.El. Brazilian-Parana Montane Grassland & Shrubland

M699. Brazilian-Parana Montane Grassland, Savanna & Forb Meadow

Type Concept Sentence: Herbaceous communities that occur above the timberline in Brazil, generally above 1800 m elevation. At the southern end of its range, this vegetation alternates with *Araucaria* forests. In substrates with more developed soils, the open grassland communities cover great extents, while in predominantly rocky landscapes, saxicolous communities dominated by terrestrial bromeliads and orchids in addition to species of Cyperaceae, Eriocaulaceae, and Xyridaceae occur. The latter communities are characteristic of eastern Brazil, where they occur mostly in the Cadeia do Espinhaco above approximately 800 m on very rugged terrain. This habitat is rich in endemic genera and species, among them *Wunderlichia, Vellozia*, and *Tabebuia papyrifera*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.2.El. Brazilian-Parana Montane Grassland & Shrubland (D253)

Elcode: M699

\*Scientific Name: Brazilian-Parana Montane Grassland, Savanna & Forb Meadow Macrogroup

\*Common (Translated Scientific) Name: Brazilian-Parana Montane Grassland, Savanna & Forb Meadow Macrogroup

\*Colloquial Name: Brazilian-Parana Montane Grassland, Savanna & Forb Meadow

\*Type Concept: This macrogroup corresponds to herbaceous communities that develop from 1800 m altitude, above the timberline when there are developed soils. At the southern end of its range, in Brazil, grasslands/shrubland vegetation alternates with *Araucaria* forests from 500 m altitude. In substrates with more developed soils, the open grassland communities cover great extents, while in predominantly rocky landscapes with small accumulations of soils, only saxicolous communities dominated by terrestrial bromeliads and orchids plus species of Cyperaceae, Eriocaulaceae and Xyridaceae grow. This is the case further north in eastern Brazil, where it occurs mainly in the Cadeia do Espinhaco above approximately 800 m, on very rugged terrain. Few species are able to develop adaptations to survive in an environment of extreme weather conditions and availability of resources, therefore there is a high percentage of endemic genera and species, among them *Wunderlichia* spp., *Vellozia* spp., and *Tabebuia papyrifera*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M384 Campos Rupestres Montane Savanna Macrogroup | M385 & M384 merged into M699 |
| 2013-01-17 | M385 Brazilian Atlantic Montane Savanna Macrogroup | M385 & M384 merged into M699 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2.A.3. Tropical Scrub & Herb Coastal Vegetation

Tropical Scrub & Herb Coastal Vegetation is found in tropical coastal habitats, including beaches, bluffs and dunes, where wind and water are major drivers of the vegetation, from the equator to 23°N and S latitude. It is dominated by prostrate perennials on the beach and foredune, and graminoids and scrub on backdunes and bluffs.

2. Shrub & Herb Vegetation

2.A.3.Ee. Caribbean-Mesoamerican Dune & Coastal Grassland & Shrubland

D254. Caribbean-Mesoamerican Dune & Coastal Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.3.Ee. Tropical Scrub & Herb Coastal Vegetation (F024)

Elcode: D254

\*Scientific Name: Caribbean-Mesoamerican Dune & Coastal Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Caribbean-Mesoamerican Dune & Coastal Grassland & Shrubland Division

\*Colloquial Name: Caribbean-Mesoamerican Dune & Coastal Grassland & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D026 | Eastern North American Coastal Scrub & Herb Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, BS?, CO, CR, CU, GT, HN, MX, NI, PA, PR, US, VE, XC

States/Provinces: FL, TX

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M700 | Caribbean-Mesoamerican Coastal Dune & Beach |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-03 | D314 Neotropical Dune Vegetation Division | D314 is included in D254, D255 and D256 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.3.Ee. Caribbean-Mesoamerican Dune & Coastal Grassland & Shrubland

M700. Caribbean-Mesoamerican Coastal Dune & Beach

Type Concept Sentence: This macrogroup encompasses vegetation of the beach, foredune and rock pavement of the shorelines of the Caribbean islands, extreme southern peninsular Florida, the Florida Keys, and south Florida mangrove islands.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.3.Ee. Caribbean-Mesoamerican Dune & Coastal Grassland & Shrubland (D254)

Elcode: M700

\*Scientific Name: *Sporobolus virginicus - Ipomoea pes-caprae - Suriana maritima* Coastal Dune & Beach Vegetation Macrogroup

\*Common (Translated Scientific) Name: Seashore Dropseed - Bayhops - Bay-cedar Coastal Dune & Beach Vegetation Macrogroup

\*Colloquial Name: Caribbean-Mesoamerican Coastal Dune & Beach

\*Type Concept: This macrogroup covers the gradient from the upper beach to landward features found on sand-covered shorelines, including shorelines of coastal lagoons, as well as supra-tidal coastal rock pavement and salt spray cliffs. Sand beach vegetation closest to the intertidal zone - the upper beach, comprise mostly annual nitro-halophytes occupying accumulations of drift material and sands rich in nitrogenous organic matter. In the Caribbean coasts, ephemeral growth of *Blutaparon vermiculare, Cakile lanceolata, Cyperus* spp., *Diodia serrulata, Fimbristylis cymosa, Kyllinga* spp., and *Lepidium virginicum* is characteristic, accompanied by patches of *Heliotropium curassavicum* and *Sesuvium portulacastrum*, mostly limited to small depressions. Locally, *Ipomoea pes-caprae, Alternanthera maritima, Remirea maritima*, and other upper beach and foredune species may invade the pioneer foreshore and lower backshore zone. Perennial vines such as *Canavalia rosea* and *Ipomoea pes-caprae* are generally more characteristic of tropical beaches than of temperate ones.

This beach vegetation includes the southernmost of its kind along the mainland Atlantic Coast of North America. Its southerly location distinguishes it from other types, primarily due to the prevalence of the tropical flora it supports. Dunes and foredunes of the tropical portion of the Florida peninsula are distinguished by the presence of *Canavalia rosea* on the upper beach, and *Scaevola plumieri, Suriana maritima, Chamaesyce mesembrianthemifolia*, and occasional shrubs of *Coccoloba uvifera* among *Uniola paniculata*, a perennial rhizomatous grass, whose stems trap the sand grains blown off the beach, building up the dune by growing upward to keep pace with sand burial. Besides southern Florida, the tropical distribution of this type of grassy sea-oat dunes includes the sandy beaches of the Gulf of Mexico north of the Yucatan Peninsula, Cuba, and the Bahamas.

More stable beach ridges, foredunes and primary dunes of the Antilles and the Caribbean coast of South America are colonized by low, usually leaf-succulent shrubs and subshrubs, many of them of pantropical, tropical American or cosmopolitan distribution. The communities formed are fairly constant throughout the tropics and characteristic dominants include *Argusia gnaphalodes, Batis maritima, Borrichia* spp., *Nolana galapagensis, Scaevola plumieri, Suriana maritima*, and *Uniola paniculata*. Low chenopod shrubs such as *Atriplex peruviana, Salicornia "virginica"* s.l. (*Salicornia "fruticosa"* s.l.) are also typically present.

The macrogroup also includes shrub thickets, known in Florida as coastal berms, found on long narrow storm-deposited ridges of loose sediment formed by a mixture of coarse shell fragments, pieces of coralline algae, and other coastal debris. These ridges parallel the shore and may be found in low-energy coastlines in south Florida and the Florida Keys, on the seaward edge or landward edge of the mangroves or further inland depending on the height of the storm surge that formed them. Similar shoreline thicket communities occur in several of the Caribbean islands on locations with mangroves and similar storm dynamics. These thickets are dominated by shrubs and herbs accompanied by small trees, all of tropical floristic affinity. Rock pavement and coastal cliffs are dominated by *Rachicallis americana* and *Borrichia arborescens* that occur in supra-tidal pavement areas.

\*Diagnostic Characteristics: The beach environment of this macrogroup is primarily upland, with some wet patches fed by groundwater. The vegetation may be sparse or patchy in its cover. The rocky or shifting substrate (of sand in most cases) largely limits the vegetation to pioneering, salt-tolerant, succulent annuals or perennial vines. Perennial vines are generally more characteristic of tropical beaches than of temperate ones.

\*Classification Comments: Due to the shared occurrence of *Canavalia rosea, Uniola paniculata*, and other beach grasses further north in Florida and Texas and up to the coast of Virginia, the boundary between the tropical Caribbean communities of south Florida and the south temperate ones is poorly distinguished. Some of the dominant shrubs also occur in tropical salt marsh communities. Borhidi (1991) separates the sandy shoreline vegetation into a separate class from the rocky shoreline vegetation. Here we make that distinction at the group level.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The dynamic disturbance regimes largely limit the vegetation of sandy beaches and dunes to pioneering, salt-tolerant, succulent annuals and perennial vines, which are more prevalent in these tropical examples, as compared to more northerly and temperate ones. The stands of vegetation are generally low in stature (with some clumps of taller grasses) and have sparse to patchy cover. The landward communities of coastal berms and more stable dunes form a short-statured forest or scrub ranging in height from 0.5 to 3 m, and whose structure and composition are variable depending on height and time since the last storm event.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The main components of the upper beach communities are very constant throughout the tropics, comprising, in particular, the creeping *Ipomoea pes-caprae* and *Canavalia rosea*. Specifically, tropical American elements include *Alternanthera ficoidea, Batis maritima, Capraria biflora, Heliotropium curassavicum*, and *Tephrosia cinerea (= var. littoralis)*. *Ipomoea pes-caprae*, the grass *Sporobolus virginicus*, and various succulents are among the principal dominants.

Beach ridges, foredunes and primary dunes of the Caribbean coasts are colonized by dense scrubs dominated by the succulent subshrub *Argusia gnaphalodes (= Tournefortia gnaphalodes)* and the succulent shrub *Suriana maritima* with *Chamaesyce mesembrianthemifolia (= Euphorbia mesembrianthemifolia)*, often accompanied by *Blutaparon vermiculare, Cyperus* spp., *Erigeron* spp., *Opuntia* spp., *Sesuvium portulacastrum, Stemodia maritima, Talinum paniculatum*, and occasional, *Borrichia arborescens, Scaevola plumieri, Spilanthes urens*, and *Turnera ulmifolia*. These communities are typical of stabilized sites where there is a continuous supply of sand brought by the trade winds. In the Caribbean coasts, ephemeral growth of *Blutaparon vermiculare (= Philoxerus vermicularis), Cakile lanceolata, Cyperus* spp., *Diodia serrulata (= Diodia maritima), Fimbristylis cymosa (= Fimbristylis spathacea), Kyllinga* spp., and *Lepidium virginicum* is characteristic, accompanied by patches of *Heliotropium curassavicum* and *Sesuvium portulacastrum*, mostly limited to small depressions. Locally, *Ipomoea pes-caprae, Alternanthera maritima, Remirea maritima*, and other upper beach and foredune species may invade the pioneer foreshore and lower backshore zone. Perennial vines such as *Canavalia rosea* and *Ipomoea pes-caprae* are generally more characteristic of tropical beaches than of temperate ones.

In southeastern Florida the most stable berms may share some tree species with rockland hammocks, but generally have a greater proportion of shrubs and herbs (Ross et al. 1992, as cited in FNAI 2010a). Tree species may include *Bursera simaruba, Casasia clusiifolia (= Genipa clusiifolia), Coccoloba uvifera, Coccothrinax argentata, Drypetes diversifolia, Guapira discolor*, and *Metopium toxiferum*. Characteristic tall shrub and short tree species include *Eugenia foetida, Pithecellobium keyense, Randia aculeata, Sideroxylon celastrinum*, and *Ximenia americana*. Short shrubs and herbs include *Hymenocallis latifolia, Lantana involucrata*, and *Rivina humilis* (Ross et al. 1992, Kruer 1992, as cited in FNAI 2010a). The sparsely vegetated coastal rocky cliffs and pavement are characterized by *Borrichia arborescens, Conocarpus erectus, Erithalis fruticosa, Lithophila muscoides, Opuntia dillenii, Rachicallis americana, Sesuvium maritimum, Sesuvium portulacastrum, Strumpfia maritima*, and *Trianthema portulacastrum*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Plants on the foredune are regularly exposed to salt spray and sand burial from onshore winds. Plants on the upper beach are subject to these stresses plus occasional inundation by seasonal or storm tides and periodic destruction by waves. The plants of the beach dune community are adapted to either withstand these stresses or to rapidly re-colonize from seed or vegetative parts following destruction. Fertilization from piles of seaweed washed up by storms helps to speed plant growth and the re-colonization process. Once a new foredune ridge blocks salt spray and plant cover inhibits sand movement, inland herbaceous and eventually woody species can begin to replace the coastal pioneer species of the beach dune community in the backdune area. The southeast coast of Florida has some of the highest wave energy along the entire Atlantic Coastal Plain (Tanner 1960). The coastal berm is deposited by storm waves along low-energy coasts. Their distance inland depends on the height of the storm surge. Tall berms may be the product of repeated storm deposition. Excavation of one berm in the Florida Keys revealed several layers of buried soils, evidence for burial by repeated storms at relatively long intervals (Kruer 1992, as cited in FNAI 2010a). Coastal berms that are deposited far enough inland and remain long-undisturbed may in time succeed to maritime hammock (FNAI 2010a). Fires are rare to non-existent in this scrub community. In south Florida, invasion by exotics, including *Casuarina equisetifolia, Schinus terebinthifolius, Scaevola sericea var. sericea, Thespesia populnea*, and *Colubrina asiatica*, following storm disturbance is an ongoing threat to this community.

ENVIRONMENT

Environmental Description: This macrogroup is found on reliefs constituted either by dunes, onshore wind-carried sand deposits arranged in cordons of ridges parallel to the coast, or by beach-ridges, wave and longshore drift-carried sand deposits, also often organized in successive parallel berms produced by the progradation of the beach. Beach dune may be distinguished from coastal grassland by its position above the immediate shoreline and by the dominance of grasses, such as *Uniola* and *Panicum*, that are tolerant of being buried in sand. It differs from coastal berm in its position facing the open ocean on a sandy coast rather than on a storm-deposited shell ridge on a mangrove-dominated shoreline. The sparsely vegetated coastal cliffs, rocky outcrops, dogtooth limestone, and boulderfields are supra-tidal and exposed to winds and salt spray. *Climate*: The climate is tropical to subtropical, with frosts being extremely rare events.

DISTRIBUTION

\*Geographic Range: This system occurs in the Caribbean islands, extreme southern peninsular Florida, the Florida Keys, and Mexico.

Nations: BR, BS?, CO, CR, CU, GT, HN, MX, NI, PA, PR, US, VE, XB, XC

States/Provinces: FL, TX

USFS Ecoregions (2007) [optional]: 255D:CC, 411A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G127 | Caribbean Coastal Beach & Dune |
| G467 | Caribbean Coastal Rocky Shore & Cliff |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-03 | M858 Neotropical Dune Vegetation Macrogroup | M858 concept covered by M700 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | *Ipomoea-Mallotonietea* | Borhidi 1991 | Herbaceous and shrubby vegetation of tropical sandy shores. |
| < | *Sesuvio-Rachicallietea* | Borhidi 1991 | Halophytic vegetation of the supratidal rocky shores of the Caribbean. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne and C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

Barbour, M. G., M. Rejmanek, A. F. Johnson, and B. M. Pavlik. 1987. Beach vegetation and plant distribution patterns along the northern Gulf of Mexico. Phytocoenologia 15:201-234.

Borhidi, A. 1991. Phytogeography and vegetation ecology of Cuba. Akademiai Kiado. Budapest, Hungary. 858 pp. plus color plates and map by A. Borhidi and O. Muniz (1970) inside of back cover.

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Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Johnson, A. F., and M. G. Barbour. 1990. Dunes and maritime forests. Pages 429-480 in: R. L. Myers and J. J. Ewel, editors. Ecosystems of Florida. University of Central Florida Press, Orlando.

Tanner, W. F. 1960. Florida coastal classification. Gulf Coast Association of Geological Societies Transactions 10:259-266.

WNHP [Washington Natural Heritage Program]. 2011. Ecological integrity assessments for the ecological systems of Washington. Version: 2.22.2011. Washington Natural Heritage Program, Department of Natural Resources, Olympia. [http://www1.dnr.wa.gov/nhp/refdesk/communities/eia\_list.html] (accessed September 9, 2013).

2. Shrub & Herb Vegetation

2.A.3.Ef. Tropical Western Atlantic Dune & Coastal Grassland & Shrubland

D255. Tropical Western Atlantic Dune & Coastal Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.3.Ef. Tropical Scrub & Herb Coastal Vegetation (F024)

Elcode: D255

\*Scientific Name: Tropical Western Atlantic Dune & Coastal Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Tropical Western Atlantic Dune & Coastal Grassland & Shrubland Division

\*Colloquial Name: Tropical Western Atlantic Dune & Coastal Grassland & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, GF, GY, SR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M702 | Brazilian Atlantic Coastal Beach & Dune |
| M701 | Eastern Guianan Coastal Rocky Shore & Beach |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-03 | D314 Neotropical Dune Vegetation Division | D314 is included in D254, D255 and D256 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.3.Ef. Tropical Western Atlantic Dune & Coastal Grassland & Shrubland

M702. Brazilian Atlantic Coastal Beach & Dune

Type Concept Sentence: Two vegetation types occurring along the Atlantic coast in Brazil: the locally known "restingas" and the dune vegetation of the Amazon River delta. The restingas group includes a variety of vegetation types that characterize stabilizing dunes. The communities develop on marine sedimentary sands or podzolized sands of the coastal fringe or interior lagoon systems. Due to the successional mosaics and substrate gradients, the vegetation varies from open to closed scrub forests, with *Allagoptera arenaria, Byrsonima gardneri, Bonnetia stricta, Clusia* spp., and *Eugenia* spp. typical. Close to the Amazon River mouth, the podzolized sands are more common due to the humid weather. Here the vegetation is an open scrub dominated by *Byrsonima crassifolia, Chrysobalanus icaco, Hibiscus tiliaceus, Ipomoea pes-caprae*, and *Manilkara triflora*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.3.Ef. Tropical Western Atlantic Dune & Coastal Grassland & Shrubland (D255)

Elcode: M702

\*Scientific Name: Brazilian Atlantic Coastal Beach & Dune Macrogroup

\*Common (Translated Scientific) Name: Brazilian Atlantic Coastal Beach & Dune Macrogroup

\*Colloquial Name: Brazilian Atlantic Coastal Beach & Dune

\*Type Concept: This macrogroup includes two vegetation types occurring along the Atlantic Coast in Brazil, the locally known "restingas" and the dune vegetation of the Amazon River delta. The restingas group a variety of vegetation types that represent the process of stabilization of the dunes through stages of vegetation colonization. The coastal plain can extend in some places 40 to 50 km inland. The communities develop on marine sedimentary sands or podzolized sands of the coastal fringe, and also associated with the inner lagoon systems. Due to the process of succession (natural and induced) and mosaics and gradients in the substrate from the coast inland, the vegetation has varied physiognomies from open to closed scrub forests. Depending of the developmental stage, some of the characteristic species of the restingas are *Allagoptera arenaria, Byrsonima gardneri, Bonnetia stricta, Clusia lanceolata, Clusia hilariana, Clusia fluminensis, Cassia australis, Senna uniflora (= Cassia uniflora), Croton sellowii, Erythroxylum ovalifolium, Eugenia nitida, Eugenia uniflora, Eugenia ovalifolia, Lagenocarpus rigidus, Pouteria psamophila, Manilkara subsericea, Mimosa lewisii, Myrcia lundiana, Phyllanthus angustissimus, Pilocereus arrabidae, Rheedia brasiliensis, Aechmea lingulata, Billbergia amoena, Hohenbergia* spp., and *Syngonanthus* sp. On the coastal plain close to the Amazon River mouth, the podzolized sands are more common due to the humid weather. This substrate is nutrient-poor and the vegetation is a more open scrub dominated by *Chrysobalanus icaco, Hibiscus tiliaceus, Byrsonima crassifolia, Ipomoea pes-caprae*, and *Manilkara triflora*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.3.Ef. Tropical Western Atlantic Dune & Coastal Grassland & Shrubland

M701. Eastern Guianan Coastal Rocky Shore & Beach

Type Concept Sentence: Herbaceous vegetation that occurs on beaches or evergreen shrubs that settle in permanent sandbars along the coasts of Brazil, Guyana, French Guiana and Surinam. Diagnostic species are *Acacia nilotica, Canavalia rosea, Conocarpus erectus, Crotalaria retusa, Fimbristylis cymosa, Hibiscus tiliaceus, Ipomoea pes-caprae, Ipomoea imperati , Phyllanthus attenuatus, Randia formosa, Sesuvium portulacastrum, Thespesia populnea*, and *Vigna luteola*. Also includes scattered vegetation that grows on soils accumulated on rocky coasts or cliffs subjected to saline winds and xerophyllous conditions due to the shallow soils.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.3.Ef. Tropical Western Atlantic Dune & Coastal Grassland & Shrubland (D255)

Elcode: M701

\*Scientific Name: Eastern Guianan Coastal Rocky Shore & Beach Macrogroup

\*Common (Translated Scientific) Name: Eastern Guianan Coastal Rocky Shore & Beach Macrogroup

\*Colloquial Name: Eastern Guianan Coastal Rocky Shore & Beach

\*Type Concept: Mainly herbaceous vegetation scattered on beaches and evergreen shrubs that settle in permanent sandbars behind the strand or beach in the coasts of Brazil, Guyana, French Guiana and Surinam. Species diagnostic for this macrogroup are *Ipomoea pes-caprae, Ipomoea imperati (= Ipomoea stolonifera), Canavalia rosea (= Canavalia maritima), Vigna luteola, Fimbristylis cymosa (= Fimbristylis spathacea), Sesuvium portulacastrum, Crotalaria retusa, Thespesia populnea, Hibiscus tiliaceus, Conocarpus erectus, Randia formosa, Phyllanthus attenuatus*, and *Acacia nilotica (= Acacia arabica)*. The macrogroup also includes scattered vegetation that grows on soils accumulated on rocky coasts or cliffs which are subjected to saline winds and xerophilous conditions due to the very shallow soils. Species that grow in this condition are *Talinum paniculatum, Ludwigia octovalvis, Philodendron acutatum, Cydista aequinoctialis, Omphalea diandra, Furcraea foetida, Coussapoa asperifolia, Ficus amazonica, Spondias mombin*, and *Alstroemeria aurea (= Acrocomia lasiospatha)*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, GF, GY, SR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.3.Eg. Tropical Eastern Pacific Dune & Coastal Grassland & Shrubland

D256. Tropical Eastern Pacific Dune & Coastal Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.A.3.Eg. Tropical Scrub & Herb Coastal Vegetation (F024)

Elcode: D256

\*Scientific Name: Tropical Eastern Pacific Dune & Coastal Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Tropical Eastern Pacific Dune & Coastal Grassland & Shrubland Division

\*Colloquial Name: Tropical Eastern Pacific Dune & Coastal Grassland & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D027 | Pacific North American Coastal Scrub & Herb Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, CR, EC, NI, PA, SV

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M703 | Tropical Eastern Pacific Coastal Beach & Dune |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-03 | D314 Neotropical Dune Vegetation Division | D314 is included in D254, D255 and D256 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.A.3.Eg. Tropical Eastern Pacific Dune & Coastal Grassland & Shrubland

M703. Tropical Eastern Pacific Coastal Beach & Dune

Type Concept Sentence: Coastal beaches and dunes located throughout tropical latitudes of western Mexico, Central America, and South America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.A.3.Eg. Tropical Eastern Pacific Dune & Coastal Grassland & Shrubland (D256)

Elcode: M703

\*Scientific Name: Tropical Eastern Pacific Coastal Beach & Dune Macrogroup

\*Common (Translated Scientific) Name: Tropical Eastern Pacific Coastal Beach & Dune Macrogroup

\*Colloquial Name: Tropical Eastern Pacific Coastal Beach & Dune

\*Type Concept: The macrogroup includes both the communities that develop on beaches and dunes, mainly composed of sclerophyllous herbs, some with succulent leaves, as well as low open forests that develop on the very recent and moderately drained coastal sediments, usually behind the dunes. This environment is dominated by shrubs and low trees and palms, native and the introduced coconut. Grasses are present but are not dominant in either environment. The open forests on more developed soils are not periodically influenced by the tides, except in exceptional swells; however, there may be saturation of deeper soil layers. Characteristic species are *Coccoloba uvifera, Elaeis guianensis, Hibiscus tiliaceus, Caesalpinia bonduc (= Caesalpinia crista), Pithecellobium dulce, Prosopis juliflora, Pithecellobium dulce, Bromelia karatas, Crataeva tapia, Coccoloba floribunda, Pithecellobium oblongum, Hippomane mancinella, Vachellia farnesiana (= Acacia farnesiana), Uniola pittieri, Joubea pilosa, Cenchrus echinatus, Ipomoea pes-caprae, Heliotropium curassavicum, Calotropis gigantea, Canavalia rosea, Canavalia rosea (= Canavalia maritima), Vigna peduncularis, Crotalaria* spp., *Opuntia lutea, Croton niveus*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, CR, EC, NI, PA, SV

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2.B. Temperate & Boreal Grassland & Shrubland

Temperate & Boreal Grassland & Shrubland is dominated by mesomorphic grasses and shrubs, with or without scattered trees (and trees typically <10% cover), ranging from temperate coastal to inland lowland and montane grasslands and shrublands, with a strongly seasonal climate and at least some frost to extended cold seasons.

2.B.1. Mediterranean Scrub & Grassland

Mediterranean Scrub & Grassland includes the sclerophyllous scrub that develops in Mediterranean climates found in the Mediterranean Basin, lowland California in the United States, west-central Chile, the western Cape Province of South Africa, and southwestern and southern Australia. It also includes Mediterranean grasslands, "wildflower fields," and prairies from California.

2. Shrub & Herb Vegetation

2.B.1.Ei. Chilean Mediterranean Scrub, Grassland & Forb Meadow

D273. Chilean Mediterranean Scrub, Grassland & Forb Meadow

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.1.Ei. Mediterranean Scrub & Grassland (F038)

Elcode: D273

\*Scientific Name: Chilean Mediterranean Scrub, Grassland & Forb Meadow Division

\*Common (Translated Scientific) Name: Chilean Mediterranean Scrub, Grassland & Forb Meadow Division

\*Colloquial Name: Chilean Mediterranean Scrub, Grassland & Forb Meadow

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M742 | Central Chilean Interior Scrub |
| M741 | Central Chilean Coastal Scrub |
| M743 | Southern Andean Mediterranean Montane Scrub & Forb Meadow |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-15 | D106 Chilean Mediterranean Scrub Division | replaced |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.1.Ei. Chilean Mediterranean Scrub, Grassland & Forb Meadow

M742. Central Chilean Interior Scrub

Type Concept Sentence: Shrublands up to 3 m high with open canopies and sclerophyllous thorny species growing in areas with a dry Mediterranean climate in the inland valleys and western slopes of the Andes in central Chile. The vegetation has scattered taller trees, and an herbaceous layer develops in the spring. Diagnostic species are *Adesmia confusa, Avena barbata, Baccharis paniculata, Bridgesia incisaefolia, Bromus berteroanus, Colliguaja odorifera, Cordia decandra, Ephedra chilensis, Erodium cicutarium, Flourensia thurifera, Heliotropium stenophyllum, Kageneckia oblonga, Lithraea caustica, Llagunoa galndulosa, Nassella chilensis, Ophryosporus paradoxus, Porlieria chilensis, Proustia cinerea, Proustia cuneifolia, Quillaja saponaria, Retanilla trinervia, Schinus polygamus*, and *Trevoa quinquinervia*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.1.Ei. Chilean Mediterranean Scrub, Grassland & Forb Meadow (D273)

Elcode: M742

\*Scientific Name: Central Chilean Interior Scrub Macrogroup

\*Common (Translated Scientific) Name: Central Chilean Interior Scrub Macrogroup

\*Colloquial Name: Central Chilean Interior Scrub

\*Type Concept: Shrubland up to 3 m high, with open canopy and sclerophyllous thorny species, growing in the inland valleys and western slopes of the Andes in central Chile with dry Mediterranean climate. It has scattered taller trees and a herbaceous layer develops in spring. Diagnostic species are *Adesmia confusa, Avena barbata, Baccharis paniculata, Bridgesia incisaefolia, Bromus berteroanus, Colliguaja odorifera, Cordia decandra, Ephedra chilensis, Erodium cicutarium, Flourensia thurifera, Heliotropium stenophyllum, Kageneckia oblonga, Lithraea caustica, Llagunoa galndulosa, Nassella chilensis, Ophryosporus paradoxus, Porlieria chilensis, Proustia cinerea, Proustia cuneifolia, Quillaja saponaria, Retanilla trinervia, Schinus polygamus*, and *Trevoa quinquinervia*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.1.Ei. Chilean Mediterranean Scrub, Grassland & Forb Meadow

M741. Central Chilean Coastal Scrub

Type Concept Sentence: Short, sclerophyllous shrublands and arid steppes occurring on sandy or rocky substrates in the central and north-central Chilean coastal zone. Shrublands are 1.5-2 m high and interspersed. Succulent rosette plants and columnar cacti grow in the less arid part of the range. Diagnostic species include *Anisomeria litoralis, Azara celastrina, Eupatorium glechonophyllum, Fuchsia lycioides, Lithraea caustica, Pouteria splendens, Puya chilensis*, and *Schinus latifolius*. Some of the species grow as trees further inland. Under drier conditions further north, diagnostic species include *Baccharis macraei, Bahia ambrosioides, Eulychnia acida, Haplopappus foliosus*, and *Solanum pinnatum*. Bare soil patches are covered during the spring with annuals such as *Balbisia peduncularis, Fuchsia lycioides, Heliotropium stenophyllum, Lobelia polyphylla*, and *Oxalis gigantea*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.1.Ei. Chilean Mediterranean Scrub, Grassland & Forb Meadow (D273)

Elcode: M741

\*Scientific Name: Central Chilean Coastal Scrub Macrogroup

\*Common (Translated Scientific) Name: Central Chilean Coastal Scrub Macrogroup

\*Colloquial Name: Central Chilean Coastal Scrub

\*Type Concept: Short sclerophyllous shrublands and arid steppes of central and central-north Chile coastal strip, with semi-arid to arid ombrotype, sandy or rocky substrate and the influence of strong marine winds. A shrubland 1.5-2 m high interspersed with succulent rosette plants and columnar cacti grows in the less arid part of the range; some of the shrub species grow as trees further inland under less harsh conditions. Diagnostic species of this type are *Schinus latifolius, Azara celastrina, Lithraea caustica, Fuchsia lycioides, Pouteria splendens, Eupatorium glechonophyllum, Anisomeria litoralis, Fuchsia lycioides*, and *Puya chilensis*. Further north along the coast, in the arid part of the distribution range of the macrogroup, it is represented by a semi-open shrub canopy less than 1 m tall formed by succulent Bromeliaceae and Cactaceae with a dominance of *Puya* rosettes which can reach up to 2 m high. Diagnostic species are *Puya chilensis, Baccharis macraei, Bahia ambrosioides, Haplopappus foliosus, Solanum pinnatum*, and *Eulychnia acida*. Under more arid conditions the bared soil patches are covered with annuals during the spring. Characteristic species of this type are *Heliotropium stenophyllum, Oxalis gigantea, Balbisia peduncularis, Fuchsia lycioides*, and *Lobelia polyphylla*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.1.Ei. Chilean Mediterranean Scrub, Grassland & Forb Meadow

M743. Southern Andean Mediterranean Montane Scrub & Forb Meadow

Type Concept Sentence: Herbaceous and short shrubland communities that develop on the rocky Andean slopes in central Chile where there is a dry to subhumid Mediterranean climate. Plant communities typically develop around boulders and rocky substrates which accumulate pockets of soil. These communities are dominated by species of *Puya*, cacti, and short herbs. Characteristic species include *Colliguaja odorifera, Haplopappus integerrimus, Puya berteroniana, Puya coerulea, Retanilla trinervia, Trichocereus chilensis, Tristerix aphyllus*, and *Tweedia birostrata*. Above 2000 m elevation, cespitose bunchgrass species and microphyllous, thorn shrubs, including cushion-forming ones, dominate. Species composition varies between the western and eastern Andean slopes.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.1.Ei. Chilean Mediterranean Scrub, Grassland & Forb Meadow (D273)

Elcode: M743

\*Scientific Name: Southern Andean Mediterranean Montane Scrub & Forb Meadow Macrogroup

\*Common (Translated Scientific) Name: Southern Andean Mediterranean Montane Scrub & Forb Meadow Macrogroup

\*Colloquial Name: Southern Andean Mediterranean Montane Scrub & Forb Meadow

\*Type Concept: This macrogroup represents several herbaceous and short shrubland communities that develop on the western slopes of the Andes in central Chile, with dry to sub-humid Mediterranean climate. These slopes are usually very rocky and show some bare soil areas. Generally, plant communities develop on or around boulders and rocky substrates which accumulate pockets of soil and provide microhabitats for plats to grow. These communities are dominated by succulent caulirosulates of the genus *Puya*, cacti species and other short herbs. The lower slopes (800-1500 m altitude) present larger forms of these plants and also shrubs forming part of the community. Vegetation on higher slopes, above 1600 m elevation, also includes succulent, thorny species but those tend to be shorter, as well as fewer shrubs. Characteristic species of these communities are *Trichocereus chilensis, Retanilla trinervia, Colliguaja odorifera, Dioscorea heterophylla, Tristerix aphyllus, Puya coerulea, Puya berteroniana, Eryngium paniculatum, Calceolaria polifolia, Tweedia birostrata*, and *Haplopappus integerrimus*. Included also in this macrogroup are herb and shrub communities growing from ca. 2000 to 3000 m elevation on the Andean slopes, in western Mendoza and Neuquen in Argentina and in central Chile. These are cespitose bunchgrass species and microphyllous, thorn shrubs, including cushion-forming ones with some differences in composition between the western and eastern Andean slopes. In the former, typical taxa are *Nardophyllum lanatum, Nassauvia heterophylla, Anarthrophyllum cummingii, Junellia spathulata, Berberis empetrifolia, Chuquiraga oppositifolia, Tetraglochin alatum, Acaena splendens, Ephedra chilensis*, and *Mulinum spinosum*, and in the latter are *Adesmia remyana, Adesmia horrida, Adesmia obovata, Adesmia pinifolia, Doniophyton patagonicum, Berberis empetrifolia, Mulinum spinosum, Mulinum ulicinum, Mulinum crassifolium, Nassauvia axillaris*, and *Pantacantha ameghinoi*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | D142 Southern Andean Shrubland & Grassland Division | D142 replaced by M743 |
| 2013-05-10 | M319 Chilean Mediterranean Montane Grassland & Scrub Macrogroup | M319 replaced by M743 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.1.Ej. Chaco-Espinal Scrub & Grassland

D274. Chaco-Espinal Scrub & Grassland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.1.Ej. Mediterranean Scrub & Grassland (F038)

Elcode: D274

\*Scientific Name: Chaco-Espinal Scrub & Grassland Division

\*Common (Translated Scientific) Name: Chaco-Espinal Scrub & Grassland Division

\*Colloquial Name: Chaco-Espinal Scrub & Grassland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M744 | Chaco Serrano Scrub & Grassland |
| M745 | Monte Scrub & Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

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\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.1.Ej. Chaco-Espinal Scrub & Grassland

M744. Chaco Serrano Scrub & Grassland

Type Concept Sentence: Mosaics of scrub and grassland that cover the lower, pre-Andean ridges of northwestern Argentina from Cordoba north. They occur from 600 to 1500 m elevation in areas with xeric to subhumid climates. The vegetation has up to 75% cover, and occurs on slopes and foothills with rocky outcrops alternating with patches of more developed sandy soils. At lower elevations, the scrub transitions to Chacoan forests, whereas at upper elevations it transitions to grasslands. Dominant scrub species are *Flourensia campestris* and *Flourensia oolepis*, with *Baccharis flabellata, Baccharis rufescens, Eupatorium buniifolium*, and *Heterothalamus alienus* alternating with woody *Fagara coco, Lithraea ternifolia*, and *Schinopsis haenkeana*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.1.Ej. Chaco-Espinal Scrub & Grassland (D274)

Elcode: M744

\*Scientific Name: Chaco Serrano Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Chaco Serrano Scrub & Grassland Macrogroup

\*Colloquial Name: Chaco Serrano Scrub & Grassland

\*Type Concept: This macrogroup represents the mosaic of scrub and grassland that covers the lower, pre-Andean ridges of northwestern Argentina from Cordoba north, from 600 -1500 m elevation, with xeric to subhumid climate. These are scrubs with up to 75% cover and a maxinum height of 2 m, on rocky slopes and foothills with rock outcrops alternating with patches of more developed sandy soils. To the lower elevations the scrub transitions to Chacoan forests and to the upper elevations it transitions to mostly grasslands. Dominant scrub species on the drier slopes are *Flourensia campestris* and *Flourensia oolepis*, with *Heterothalamus alienus, Eupatorium buniifolium, Baccharis rufescens, Baccharis flabellata* alternating with woody species of *Lithraea ternifolia, Schinopsis haenkeana*, and *Fagara coco*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

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2. Shrub & Herb Vegetation

2.B.1.Ej. Chaco-Espinal Scrub & Grassland

M745. Monte Scrub & Grassland

Type Concept Sentence: Mosaics of *Larrea* scrub and open *Prosopis* or *Geoffroea* phreatophytic woodlands characteristic of the Monte phytogeographical region in Argentina, west of the Pampas. This vegetation can be found on sandy alluvial plains between major rivers, smaller endorreic basins, and the valley between the pre-Cordillera range and the Andes Cordillera. The climate is xeric and elevation ranges from 800 to 2400 m. *Larrea*, the dominant genus of this scrub, includes several species adapted to different soil conditions. *Larrea tridentata* and *Larrea cuneifolia* co-occur in the alluvial plains with *Bulnesia retama, Atamisquea emarginata, Condalia microphylla, Lycium chilense*, and *Ximenia americana* in the lower stratum and *Prosopis* spp. and *Geoffroea decorticans* in the upper stratum.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.1.Ej. Chaco-Espinal Scrub & Grassland (D274)

Elcode: M745

\*Scientific Name: Monte Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Monte Scrub & Grassland Macrogroup

\*Colloquial Name: Monte Scrub & Grassland

\*Type Concept: This macrogroup represents the mosaic of *Larrea* scrub and open *Prosopis* or *Geoffroea* phreatophytic woodlands characteristic of the Monte phytogeographical region in Argentina. They are distributed west of the Pampas and south of the Chaco, occupying the sandy alluvial plains between the Desaguadero and Colorado rivers, other smaller endorheic basins, and the valley between the pre-Cordillera range and the Andes Cordillera proper. The climate is xeric and elevation varies from 800 to 2200 m. *Larrea*, the dominant genus of this type of scrub, includes several species distributed according to the type of soil and its humidity, texture and salt content. In the alluvial plains *Larrea tridentata (= Larrea divaricata)* and *Larrea cuneifolia* are accompanied by *Atamisquea emarginata (= Capparis atamisquea), Lycium chilense var. minutifolium, Ximenia americana*, and *Condalia microphylla*, with *Ephedra breana, Atriplex lampa, Aristida inversa, Fabiana peckii, Flaveria bidentis, Prosopanche americana, Bulnesia retama* in the lower stratum, and *Prosopis flexuosa, Prosopis caldenia, Prosopis chilensis*, and *Geoffroea decorticans* forming the upper stratum. In the intermontane valleys it occurs on the sideslopes and up to 2400 m altitude. The cover is low and *Larrea* species alternate with herbs such as *Hyalis argentea var. argentea, Scleropogon brevifolius, Stipa cacheutensis*, and with small groves of *Discaria chacaye* in the river margins of the valley bottom.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.1.Na. Californian Scrub & Grassland

D327. Californian Scrub & Grassland

Type Concept Sentence: This division encompasses Californian scrub (chaparral), grassland and meadow vegetation within the warm-temperate Californian Floristic Province, from southwestern Oregon through California, west of the Sierra-Cascades divide and south into northwestern Baja California, Mexico.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.1.Na. Mediterranean Scrub & Grassland (F038)

Elcode: D327

\*Scientific Name: *Adenostoma fasciculatum - Artemisia californica - Nassella pulchra* Scrub & Grassland Division

\*Common (Translated Scientific) Name: Chamise - Coastal Sagebrush - Purple Needlegrass Scrub & Grassland Division

\*Colloquial Name: Californian Scrub & Grassland

\*Type Concept: This division includes a variety of native scrub or chaparral and annual and perennial native and non-native grass and herb vegetation endemic to the Mediterranean climate zone of western North America, centered within California. This suite of scrub, grasslands and meadows occupies hills, coastal terraces, and valleys with appropriate soil and climatic conditions from as far north as southwestern Oregon to the western edges of the Mojave Desert and the foothills of the San Pedro Martir in northwestern Baja California, Mexico. Depending upon soil, climate, and site history, ecological relationships exist between the main macrogroups of the division. In the driest and warmest areas grasslands are generally composed of annual native forbs characterized by species of genera such as *Lasthenia, Phacelia, Amsinckia*, and *Eschscholzia*, with relatively low non-native composition. In these drier settings deciduous scrub species (including *Artemisia, Eriogonum*, and *Salvia*) tend to have seral relationships with the aforementioned grassland species. In the moister portions of California grasslands tend to be characterized by perennials (including species of *Nassella, Melica, Leymus*, and *Bromus*) and have seral relationships with evergreen sclerophyll or hemi-sclerophyll shrublands (including species of *Adenostoma, Arctostaphylos, Ceanothus, Frangula californica*, and *Baccharis pilularis*). In intermediate settings relationships between sclerophyllous scrub (chaparral), deciduous scrub (e.g., coastal sage scrub), annual and perennial grasslands, and non-native ruderal scrubs and grasslands tend to segregate based on soil texture, topography and exposure. In areas where disturbance levels are intense and frequent the grasslands and shrublands have been converted to ruderal shrub and herbaceous vegetation characterized by several Eurasian species (including members of the genera *Avena, Bromus, Cynosurus, Centaurea, Brassica*, and *Hirschfeldia*).

The California coastal scrub macrogroup is dominated by shallow-rooted, drought-deciduous shrubs which tend to be short-lived (<80 years) and have simple arbuscular mycorrhizal fungal associations. They include species from the genera *Artemisia, Eriogonum, Diplacus*, and *Salvia*, among others. Diagnostic species of the Californian chaparral have evergreen sclerophyll leaves and tend to be deep-rooted and long-lived (>100 years) and include species of *Adenostoma, Arctostaphylos*, and *Ceanothus*, as well as endemic shrubby *Quercus, Rhamnus*, and *Frangula* species. They may be obligate-seeding (killed by stand-replacing fires), obligate-sprouting (resprouting readily from burls or woody tubers following fires), or facultative sprouters (seeds polymorphous, some bank, and some germinate without fire; shrubs also resprout). Chaparral diagnostics tend to have complex ectomycorrhizal fungi associations with trees. The Californian grassland include both annual and perennial species of grasses and herbs from a variety of genera, including *Nassella, Melica, Lasthenia, Phacelia, Amsinckia*, and *Eschscholzia*.

Ruderal exotics include several members of the Brassicaceae (*Brassica nigra, Brassica rapa var. rapa, Hirschfeldia incana, Raphanus sativus*), Asteraceae (*Carduus pycnocephalus, Centaurea solstitialis, Centaurea melitensis, Silybum marianum, Picris echioides, Hypochaeris* spp., etc.), and Poaceae (*Avena* spp., *Bromus* spp., *Cynosurus* spp., *Aegilops* spp., *Lolium perenne*, and others). Species in non-native shrublands include *Ulex europaeus, Cytisus scoparius*, and species of *Genista* and *Spartium*, among others. These non-natives have established over many years and several waves of Eurasian species colonization since the 1700s. The non-native annual grasses and forbs tend to dominate the native grass species, especially where soil horizon removal or disruption, high annual stocking of livestock, soil compaction, and other major disturbances have occurred. Virtually all Californian grassland stands today have a significant non-native component. However, ruderal vegetation types are defined today by the absence or rarity of diagnostic native species.

Climatically, most stands in the division are characterized by long periods of drought during the summer months. Maximum or minimum temperatures range widely from well over 42°C in the interior valleys to around 0°C in higher parts of the foothills. North coastal stands may average over 100 cm/year while southern interior stands average as low as 15 cm of precipitation. Soil and substrate for most grassland stands tend to have some clay content to soils typically ranging from fine sandy loam to clay loam textures. Steeper, more exposed stands tend to be dominated by scrubs and have more coarse fragments and may be sandy loams. The pH ranges from moderately acidic to basic on some recent marine sediments in the South Coast Ranges.

\*Diagnostic Characteristics: In general, key taxa are divided into two groups: native scrub and herbs, and non-native largely annual or biennial herbs and grasses. For the native scrub, diagnostic taxa are divided into two groups: long-lived evergreen sclerophylls and shorter-lived non-sclerophyll evergreen or deciduous (either drought- or winter-deciduous) shrubs. Several of the diagnostic species of ~Central & Southern California Coastal Sage Scrub Group (G264)$$, such as *Artemisia californica, Encelia californica, Eriogonum fasciculatum*, and *Salvia* spp., have close relatives in the adjacent Mojave or Sonoran deserts. Diagnostics of ~California North Coastal & Mesic Scrub Group (G662)$$ are adapted to more mesic conditions, including large areas of the central and northern California coast. For example, leaves of *Baccharis pilularis* and *Ceanothus thyrsiflorus* are evergreen but are not protected with a waxy cuticle (non-sclerophyllous). Other diagnostics of this group are winter-deciduous (e.g., *Toxicodendron diversilobum*).

Among the native grasslands, the cooler, moister stands have cool-season bunchgrasses such as *Bromus carinatus, Elymus glaucus*, and *Festuca californica*. The modal vegetation of the native grasslands tends to be composed of mesophytic perennial grasses such as *Melica californica, Nassella lepida, Nassella pulchra*, and a variety of perennial geophytes (genera *Brodiaea, Triteleia, Dichelostemma, Calochortus, Chlorogalum, Zigadenus*). These may be augmented by a variety of native annual spring-flowering herbs in the genera *Eschscholzia, Lasthenia, Layia, Lotus, Lupinus, Madia, Micropus, Plagiobothrys, Stylocline, Trifolium*, and many others. Summer-flowering herbs with deep taproots, including members of the genera *Calycadenia, Deinandra, Hemizonia, Holocarpha, Madia*, and others, visually dominate late-season stands. Southward and inland the mesophytic bunchgrasses are replaced by more drought-tolerant perennial grasses such as *Nassella cernua* and *Poa secunda*. Annuals that are diagnostic in droughty conditions include members of the genera *Amsinckia, Coreopsis, Cryptantha, Eschscholzia, Gilia, Lasthenia, Layia, Mentzelia, Monolopia, Pectocarya, Phacelia*, and others).

Among the ruderal vegetation, diagnostics tend to segregate based on relative moisture and temperature. Some mesophytic species, including *Cynosurus* sp., *Briza* sp., *Conium maculatum*, and *Foeniculum vulgare*, tend to occur in moister coastal California, while many of the most well-established ruderals (*Avena*, annual *Bromus, Centaurea* sp., *Brassica* sp., etc.) occur throughout much of California west of the mountains and deserts. A limited suite of ruderals (e.g., *Bromus madritensis, Schismus* sp.) are best adapted to drier inland conditions in the southern half of California.

\*Classification Comments: Although many stands occur with high cover of *Avena* spp., *Bromus diandrus*, and other non-native *Bromus* spp., these tend to retain a native component and fluctuate in relative cover of exotic to native species depending upon particular climatic conditions of a given year or season (Buck-Diaz et al. 2012). Because non-natives tend to mix with characteristic natives in many settings, such stands have been considered part of the native ~Californian Annual & Perennial Grassland Macrogroup (M045)$$.

The principal floristic and ecological distinctions within Californian scrub are well-defined, yet contain some overlap. For example, post-disturbance stands of maritime chaparral in central California have members of coastal scrub, chaparral, and ruderal scrub macrogroups colonizing them. Further classification relationships between northern coastal and mesic scrub, and the central and southern California coastal sage scrub need investigation.

The term "scrub" is used here to indicate that the shrubs in this macrogroup are not typical broad-leaved or needle-leaved evergreen shrubs found in other temperate regions; rather, they range from sclerophylls, hemi-sclerophylls, to drought- or winter-deciduous shrubs.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D007 | Californian Forest & Woodland | Without periodic natural fire and other disturbance, stands in D327 tend to be replaced by forests and woodland types of D007, especially in the moist parts of its distribution. |
| D022 | Western North American Grassland & Shrubland | D022 (especially ~Southern Vancouverian Lowland Grassland & Shrubland Macrogroup (M050)$$) tends to overlap with D327, especially the component ~Californian North Coastal & Mesic Scrub Group (G662)$$, along the immediate coast of northern California and adjacent Oregon. ~Western North American Ruderal Grassland & Shrubland Macrogroup (M493)$$ tends to overlap with the ruderal component of D021 in the northwestern portion of California and adjacent Oregon. However, it differs by having better representation from perennial grasses and forbs. |
| D061 | Western North American Interior Chaparral | Winter snow and regular freezing temperatures above ca. 1200-1500 m tend to create a sharp zone of overlap between D020 and ~Cool Interior Chaparral Macrogroup (M094)$$ of D061. A more gradual transition between D327 and ~Warm Interior Chaparral Macrogroup (M091)$$ exists in the Transverse, Peninsular, and inner South Coast ranges of central and southern California and northern Baja California, Mexico. |
| D039 | North American Warm Desert Scrub & Grassland | Within D039, ~North American Warm Desert Ruderal Scrub & Grassland Macrogroup (M512)$$ overlaps in the southern interior portions of the range of D021 where more dry-adapted ruderal and native species occur. |
| D040 | Western North American Cool Semi-Desert Scrub & Grassland | Within D040, ~Great Basin-Intermountain Dry Shrubland & Grassland Macrogroup (M171)$$ overlaps in the interior portions of the range of this division where more dry-adapted ruderal and native species occur. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Californian scrub contains open to very dense shrublands dominated by sclerophylls, hemi-sclerophylls, or drought- or winter-deciduous shrubs, which form a canopy of from 0.5 to 5 m in height. Herbaceous species, including grasses and forbs, may be sparse or dense. Trees are widely scattered or absent in early- to mid-seral stands, but increase in cover in stands with long fire-return intervals. Within this division, ~Californian Coastal Scrub Macrogroup (M044)$$ is dominated by shallow-rooted, drought-deciduous shrubs which tend to be short-lived (<80 years) and have simple arbuscular mycorrhizal fungal associations. ~Californian Chaparral Macrogroup (M043)$$ diagnostic species have evergreen sclerophyll leaves and tend to be deep-rooted and long-lived (>100 years). They may be obligate-seeding (killed by stand-replacing fires), obligate-sprouting (resprouting readily from burls or woody tubers following fires), or facultative sprouters (seeds polymorphous, some bank, and some germinate without fire; shrubs also resprout). Chaparral diagnostics tend to have complex ectomycorrhizal fungi associations with trees. The Californian grasslands and meadows are dominated by perennial bunchgrasses, and/or annual grasses and forbs, less than 2 m in height. Shrubs and trees are widely scattered or absent.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: For Californian scrub, the key diagnostics species include a large number of woody species of the following genera *Adenostoma, Arctostaphylos, Artemisia, Ceanothus, Dendromecon, Diplacus, Ericameria, Eriodictyon, Eriogonum, Hazardia*, shrubby *Lotus, Lupinus, Quercus*, and *Salvia*. Additional diagnostics include *Heteromeles arbutifolia, Isocoma menziesii, Malosma laurina*, and *Rhus integrifolia*.

For Californian grasslands, key taxa are divided into two groups: native perennial or annual grasses and herbs, and non-native, largely annual or biennial herbs and grasses. In pre-European California, native grasslands and meadows were arranged broadly along a moisture gradient running longitudinally from the moist conditions in the northwestern parts of California southward and inland to drier semi-desert conditions in the southern San Joaquin Valley, inner South Coast Ranges, and the inland valleys of southern Coastal California. Cooler, moister stands have cool-season bunchgrasses such as *Bromus carinatus, Elymus glaucus*, and *Festuca californica*. The modal vegetation of the division tends to be composed of mesophytic perennial grasses such as *Melica californica, Nassella lepida, Nassella pulchra*, and a variety of perennial geophytes (genera *Brodiaea, Calochortus, Chlorogalum, Dichelostemma, Triteleia, Zigadenus*). These may be augmented by a variety of native annual spring-flowering herbs in the genera *Eschscholzia, Lasthenia, Layia, Lotus (= Acmispon), Lupinus, Madia, Micropus, Plagiobothrys, Stylocline, Trifolium*, and many others. Summer-flowering herbs with deep taproots, including members of the genera *Calycadenia, Deinandra, Hemizonia, Holocarpha, Madia*, and others, visually dominate late-season stands. As conditions become drier to the south of the state, perennial grasses and geophytes become scarce and ephemeral annual herbs become more important. Southward and inland the mesophytic bunchgrasses are replaced by more drought-tolerant perennial grasses such as *Nassella cernua* and *Poa secunda (= Poa scabrella)*. Once the average annual precipitation is less than about 20 cm, perennial grasses make up little significant cover. Lower precipitation tends to support only annual herbs that fluctuate in abundance with the highly variable yearly rainfall patterns. Many of these annuals have bet-hedging seed storage strategies similar to desert annuals of southwestern North America (e.g., members of the genera *Amsinckia, Coreopsis (= Leptosyne), Cryptantha, Eschscholzia, Gilia, Lasthenia, Layia, Mentzelia, Monolopia, Pectocarya, Phacelia*, and others). These annuals were responsible for many of the historic wildflower displays in El Niño years on the drier slopes of southern and central California (Minnich 2008).

Non-natives such as *Avena* spp., *Briza* spp., *Bromus diandrus, Bromus hordeaceus*, and *Cynosurus* spp., tend to prefer higher rainfall than species such as *Bromus madritensis, Hirschfeldia incana, Salsola* spp., *Schismus* spp., and *Sisymbrium* spp. In contrast to mixed native and non-native stands, ruderal species such as *Brassica nigra, Carduus pycnocephalus, Centaurea solstitialis, Centaurea melitensis, Conium maculatum, Foeniculum vulgare, Glebionis coronarium, Raphanus sativus*, and *Silybum marianum* tend to strongly dominate stands to the exclusion of most native herbs and grasses. They also tend to persist once established due to thatch build-up and morphological traits such as deep tap roots and tall growth forms, conferring a competitive advantage over the smaller, less leafy native species (D'Antonio et al. 2007). Although far fewer California native species have ruderal characteristics, there are several genera, including *Amsinckia* (especially *Amsinckia tessellata*), *Heterotheca* (especially *Heterotheca grandiflora*), and *Lupinus* (especially *Lupinus bicolor, Lupinus subvexus (= Lupinus microcarpus)*), which do have species with ruderal characteristics (some of these species have become ruderals when introduced in other countries such as Australia). The non-native annual grasses and forbs tend to dominate the native species, especially where soil horizon disruption, high annual stocking of livestock, soil compaction, and other major disturbances have occurred. Virtually all stands today have a significant non-native component. Ruderal stand soils tend to vary depending upon original pre-disturbance vegetation and may be sandy, silty, or clay-rich loams. Species in non-native shrublands include *Ulex europaeus, Cytisus scoparius*, and species of *Genista* and *Spartium*, among others.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Natural fire frequencies in Californian scrub are not particularly high, since lightning is limited to the occasional Mexican summer monsoonal thunderstorm. Natural fire frequencies for many sage scrub and chaparral landscapes have been projected to be between 20-50+ years and fire occurred primarily in the late summer and fall. Most sage scrub species decrease in cover and abundance with increased fire frequency, presence of non-native grasses, and air pollution (Westman 1979, 1983, Minnich and Dezzani 1998). Successful regeneration requires conditions where shrubs can establish, mature, and develop seed banks (Montalvo 2002a, 2002b). Recurring high-frequency fires can deplete the seed banks of many chaparral and sage scrub species, especially those that regenerate largely from seed. The species are vulnerable to local extinction under high-intensity or high-frequency fires because most regeneration is typically from seed (Keeley 1998, Montalvo 2002a, 2002b). Compared to coastal scrub species, chaparral restoration efforts have more difficulty with establishment due to more specific relationships with mycorrhizal fungi, including longer establishing ectomycorrhizal fungi, larger, fewer, seeds with more specific dispersal strategies, lower recruitment, and longer establishment times due to palatable higher nutrition foliage to herbivory and effects of drought.

By contrast, prior to European colonization, California grasslands and meadows were regularly burned by Native Americans, grazed by large ungulates such as elk, deer, and pronghorn, experienced bioturbation by fossorial mammals, and larger excavations from mammals such as grizzly bear, badger, coyote, fox, etc. Following European colonization, mechanical cultivation, tilling, clearing, and other forms of disturbance became widespread. Depending upon the geographic location, natural fluctuations in climate brought forth periods of colonization by shrubs from adjacent stands representing 2.B.1.Na ~Californian Scrub Division (D020)$$, or trees from 1.B.1.Nc ~Californian Warm Temperate Forest & Woodland Division (D007)$$. In more mesic areas, such as the North Coast of California, anthropogenic fire was the primary process that maintained open grasslands on soils that were hospitable to woody plant growth. However, in drier areas of the state, the climate in combination with clay-rich soils naturally inhibit woody plant colonization. The sparse cover of these drier sites rarely produced enough fuel to burn. Current conditions in ruderal stands within this division, such as infrequent grazing, fire, or loss of natural native seed banks, tend to restrict colonization by natives. Many areas occupied by ruderal vegetation were previously not grassland, but shrubland (2.B.1.Na) or woodland (1.B.1.Nc) and when left undisturbed for several years tend to revert to woody vegetation through phases often starting with early-seral shrub members within ~Californian Coastal Scrub Macrogroup (M889)$$.

ENVIRONMENT

Environmental Description: *Climate:* Most stands are characterized by long periods of drought during the summer months. Maximum or minimum temperatures range widely from well over 42°C in the interior valleys to around 0°C in higher parts of the foothills. North coastal stands may average over 100 cm/year while southern interior stands average as low as 15 cm of precipitation.

*Soil/substrate/hydrology:* Californian chaparral almost always avoid low-lying landscapes which are regularly inundated during the wet season. Most chaparral stands occur on relatively coarse-textured, well-drained soils, including massive sandstones, crystalline basement rocks, and coarse igneous rocks. Exceptions occur particularly within the maritime chaparral group where nutrient-poor soils may be derived from fine-textured sedimentary rocks. Coastal scrub vegetation is commonly found on fine-textured soils, but is widely tolerant of many upland soils. Where coastal scrub and chaparral coexist, the chaparral is almost always on the coarser-textured substrate. Ruderal stand soils tend to vary depending upon original pre-disturbance vegetation and may be sandy, silty, or clay-rich loams.

Most grassland stands tend to have some clay content to soils typically ranging from fine sandy loam to clay loam textures. Steeper, more exposed stands tend to have more coarse fragments and may be sandy loams. The pH ranges from moderately acidic to basic on some recent marine sediments in the South Coast Ranges. Ruderal stand soils tend to vary depending upon original pre-disturbance vegetation and may be sandy, silty, or clay-rich loams.

*Biogeography:* The isolated and unique characteristics of the California scrub and grasslands are reflected in their species composition. Virtually all native diagnostic species are endemic to the California Floristic Province. According to the Biota of North America Program (BONAP 2010), the species are particularly localized and distinctive. Virtually all of the world's species of *Arctostaphylos* (67/71 species) and *Ceanothus* (47/60), two of the most common and diverse genera of the California chaparral, are endemic to the division. Several important small and genetically distinct chaparral genera, such as *Adenostoma, Malosma*, and *Pickeringia*, are also entirely endemic to this division. ~Californian Coastal & Foothill Seral Scrub Group (G782)$$ has two of its three main genera, including *Malacothamnus* (14/14 species) and *Eriodictyon* (9/10 species), entirely or largely endemic. The non-native component is largely from Eurasian Mediterranean climates.

Similarly, for grasslands, common representative genera such as *Clarkia, Eschscholzia, Layia, Lupinus, Melica, Mentzelia, Nassella, Phacelia*, and *Plagiobothrys* are entirely or largely endemic to western North America. Several distinctive genera of Asteraceae, including *Deinandra, Holocarpha, Monolopia*, and *Pseudobahia*, appear to be entirely endemic to this division. The non-native component is largely from Eurasian Mediterranean climates.

DISTRIBUTION

\*Geographic Range: This division occurs from southwestern Oregon south throughout Mediterranean California, west of the Sierra-Cascades divide and south into northwestern Baja California, Mexico from sea level to about 1500 m (0-5000 feet) elevation.

Nations: MX, US

States/Provinces: CA, MXBC, OR

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]: Extensive sampling of native and non-native grasslands and meadows in this division has been undertaken by California Native Plant Society (CNPS) with thousands of field samples collectively represented in the databases of California Department of Fish and Wildlife (CDFW) and CNPS, collectively housed in the CDFW California Heritage Vegetation Program. Summary vegetation descriptions for many grassland types in this division are found in (Klein et al. 2007, Buck-Diaz et al. 2012, 2013).

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M043 | Californian Chaparral |
| M044 | Californian Coastal Scrub |
| M045 | Californian Annual & Perennial Grassland |
| M046 | Californian Ruderal Grassland, Meadow & Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2015-12-11 | D021 Nassella pulchra - Eschscholzia californica - Brassica nigra Californian Grassland & Meadow Division | D020 & D021 merged into D327 |
| 2015-12-11 | D020 Californian Scrub Division | D020 & D021 merged into D327 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | California Prairie | Heady et al. 1992 | but concept does not incorporate native annual component. |
| < | California annual grassland series | Sawyer and Keeler-Wolf 1995 |  |
| < | California chaparral | Hanes 1981 |  |
| < | Californian (coastal) chaparral | Pase 1982 |  |
| < | Californian Valley Grassland | Brown 1982e | includes mainly native perennial and non-native ruderal component. |
| < | Californian coastalscrub | Pase and Brown 1982 |  |
| < | Central and south coastal California seral scrub | Sawyer et al. 2009 | appendix 3 |
| < | Chaparral | Munz and Keck 1949 |  |
| < | Chaparral | Munz and Keck 1950 |  |
| < | Coastal sage scrub | Munz and Keck 1949 |  |
| < | Coastal sage scrub | Munz and Keck 1950 |  |
| < | Coastal scrub | Mayer and Laudenslayer 1988 |  |
| < | Purple needlegrass grassland series | Sawyer and Keeler-Wolf 1995 |  |
| < | Sage Scrub | Rundel 2007 |  |
| < | Southern coastal scrub | Mooney 1988 |  |
| < | Valley Grassland | Bartolome et al. 2007 | only includes native perennial and ruderal components. |
| = | Valley Needlegrass grassland, Serpentine Bunchgrass, Pine bluegrass grassland, Non-native grassland, Wildflower field | Holland 1986b | although some concepts are poorly defined, taken collectively, the 5 types encompass the division. |
| < | Valley and south coastal grassland | Keeler-Wolf et al. 2007 | only includes native perennial concept. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: H.F. Heady, J.W. Bartolome, M.D. Pitt, G.D. Savelle, and M.C. Stroud (1992)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: T. Keeler-Wolf and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 06 Jan 2016

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2. Shrub & Herb Vegetation

2.B.1.Na. Californian Scrub & Grassland

M043. Californian Chaparral

Type Concept Sentence: California chaparral consists of evergreen sclerophyllous shrublands found throughout California, extreme southern Oregon, and northern Baja California, closely associated with Mediterranean climates, from fog-belt coastal settings to extremely xeric interior stands that are dominated by a wide variety of endemic shrubs include *Adenostoma* spp., *Arctostaphylos* spp., *Ceanothus* spp., *Cercocarpus montanus var. glaber, Eriogonum fasciculatum, Fraxinus dipetala, Heteromeles arbutifolia, Quercus berberidifolia*, and many others.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.1.Na. Californian Scrub & Grassland (D327)

Elcode: M043

\*Scientific Name: *Adenostoma fasciculatum - Arctostaphylos manzanita - Quercus berberidifolia* Chaparral Macrogroup

\*Common (Translated Scientific) Name: Chamise - Whiteleaf Manzanita - Scrub Oak Chaparral Macrogroup

\*Colloquial Name: Californian Chaparral

\*Type Concept: California chaparral is an evergreen sclerophyllous shrubland macrogroup that ranges from mild fog-belt maritime slopes to very warm and xeric interior slopes. Dominant species include mostly evergreen but also some deciduous species. Characteristic dominants include *Adenostoma fasciculatum, Adenostoma sparsifolium, Arctostaphylos bakeri, Arctostaphylos glandulosa, Arctostaphylos glauca, Arctostaphylos hookeri, Arctostaphylos manzanita, Arctostaphylos montaraensis, Arctostaphylos nummularia, Arctostaphylos pajaroensis, Arctostaphylos silvicola, Arctostaphylos stanfordiana, Arctostaphylos tomentosa, Arctostaphylos tomentosa ssp. crustacea, Arctostaphylos viscida, Ceanothus cordulatus, Ceanothus crassifolius, Ceanothus cuneatus, Ceanothus greggii, Ceanothus griseus, Ceanothus leucodermis, Ceanothus masonii, Ceanothus megacarpus, Ceanothus verrucosus, Cercocarpus montanus var. glaber, Cercocarpus montanus var. minutiflorus, Cneoridium dumosum, Comarostaphylis diversifolia, Dendromecon rigida, Eriogonum fasciculatum, Frangula californica, Fraxinus dipetala, Fremontodendron californicum, Garrya flavescens, Heteromeles arbutifolia, Malacothamnus fasciculatus, Pickeringia montana, Prunus ilicifolia, Quercus berberidifolia, Quercus dumosa, Rhamnus crocea, Rhamnus ilicifolia, Rhus ovata*, and *Salvia mellifera*. Stands occur throughout California and into southwestern Oregon, and are best represented in coastal mountains, the Transverse and Peninsular ranges, and in the foothills of the Sierra Nevada. Along the coast it occurs from Mendocino County south to Ensenada in Baja California, and in the interior it occurs from Oregon into Mexico. Elevation ranges from sea level to 1830 m. Chaparral species are mostly limited to Mediterranean climate as increased summer drought stress limits seedling establishment at the Mojave Desert edge and winter freezes cause species-specific distributional limits at higher elevations. Soils are generally shallow and rocky, except near the cost where it occurs on deep eolian sands of marine benches and terraces. The composition of the chaparral flora has a fairly steep species turnover with distance. This geographic turnover is found among chaparral-associated species, chaparral-restricted species and community dominants.

\*Diagnostic Characteristics: Low to tall shrublands dominated by *Adenostoma* spp., *Arctostaphylos* spp., *Ceanothus* spp., *Cercocarpus montanus var. glaber, Fraxinus dipetala, Fremontodendron californicum, Garrya flavescens, Heteromeles arbutifolia, Lonicera* spp., *Malosma laurina, Pickeringia montana, Prunus ilicifolia, Quercus berberidifolia, Quercus chrysolepis, Quercus dumosa, Quercus durata, Quercus wislizeni var. frutescens, Rhamnus crocea, Rhamnus ilicifolia*, and *Rhus ovata*.

\*Classification Comments: This macrogroup currently contains a few types that may intergrade with ~Californian Coastal Scrub Macrogroup (M044)$$, including types dominated by *Malosma laurina* and *Rhus integrifolia* that are mixed with sage scrub species. Perhaps these types should be moved to M044 (J. Buck-Diaz pers. comm. 2014). Stands of chaparral on mafic soils appear not be included here, but they may need to be (M. Peinado pers. comm. 2014, citing O'Geen et al. 2007 in Barbour et al. 2007).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M044 | Californian Coastal Scrub |  |
| M091 | Warm Interior Chaparral | has similar morphologies and some species overlap in Peninsular and Transverse ranges and eastern Sierra Nevada of California, but most diagnostics are distinct. |
| M094 | Cool Interior Chaparral | has little overlap due to frost sensitivity of many of the M043 diagnostics. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Open to closed-canopy shrublands up to 5 m tall. Open stands may have herbaceous undergrowth, dense stands do not.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This macrogroup is made up of both obligate seeders and resprouters. Characteristic species include *Adenostoma fasciculatum, Arctostaphylos glandulosa, Arctostaphylos glauca, Arctostaphylos hookeri, Arctostaphylos manzanita, Arctostaphylos montaraensis, Arctostaphylos nummularia (= Arctostaphylos sensitiva), Arctostaphylos pajaroensis, Arctostaphylos pringlei ssp. drupacea, Arctostaphylos stanfordiana, Arctostaphylos tomentosa, Arctostaphylos tomentosa ssp. crustacea (= Arctostaphylos crustacea), Arctostaphylos viscida, Ceanothus crassifolius, Ceanothus cuneatus, Ceanothus griseus, Ceanothus leucodermis, Ceanothus masonii, Ceanothus megacarpus, Ceanothus oliganthus, Ceanothus spinosus, Ceanothus tomentosus, Ceanothus verrucosus, Cercocarpus montanus var. glaber (= Cercocarpus betuloides), Cneoridium dumosum, Comarostaphylis diversifolia, Dendromecon rigida, Eriogonum fasciculatum var. fasciculatum, Fraxinus dipetala, Fremontodendron californicum, Garrya elliptica, Heteromeles arbutifolia, Lonicera* spp., *Malacothamnus fasciculatus, Malosma laurina, Pickeringia montana, Prunus ilicifolia, Quercus berberidifolia, Quercus chrysolepis, Quercus dumosa (= var. dumosa), Quercus durata, Quercus wislizeni var. frutescens, Rhamnus crocea, Rhamnus ilicifolia, Rhus integrifolia*, and *Xylococcus bicolor*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The fire regime ranges from root sprouter-dominated shrubland that survive and regrow after stand-replacing fires. Other stands are dominated by seed reproducers that need long fire-free intervals to develop a viable seedbank that can reproduce following fire (Keeley and Davis 2007). Recent studies of many sites that have been fire-free for decades suggest that at least some of the species of *Ceanothus* may be able to germinate without fire and thus sustain populations during long fire-free intervals. Other stands are stable and do not need frequent fire to persist. Studies show that frost damage to mature plants and drought stress on seedlings may limit the range and distribution of California chaparral species (Keeley and Davis 2007).

ENVIRONMENT

Environmental Description: This macrogroup occurs on a wide variety of settings. It occurs within the fog belt along the coast of central and northern California on generally nutrient-poor edaphic conditions (sands, sandstones, other marine sediments, and stabilized sand dunes), the southern California coast and into the western foothills of the Sierra Nevada. It is typically found on arid, south-facing slopes and ridges, and occasionally on mesic sites, such as north-facing slopes, concavities, or toeslopes, with well-drained soils and mafic soils. The more frost-tolerant species are found at higher, cooler and generally more mesic sites up to approximately 1830 m (6000 feet) elevation. Chaparral is naturally displaced by woodlands on very mesic slopes and by sage scrub on xeric slopes (Keeley and Davis 2007). These shrublands include extensive areas on coarse-grained soils with annual precipitation up to 75 cm (winter rain, and only intermittent snow).

Californian chaparral is mainly linked to three conditions: climate, soil and dynamics. With regard to climate, Mediterranean climate is the norm, regardless of the total amount of precipitations, because within that macroclimate it can be found under a wide range of rainfall. However, when rainfall is low (roughly below 300 mm/year), chaparral constitutes the late-seral vegetation, whereas when rainfall is higher, chaparral plays two ecological roles. First, they constitute the edaphic vegetation living on shallow and rocky soils [see Keeley and Davis (2007)], including deep eolian sands and mafic substrates. Second, in areas with higher rainfall (~>300 mm), they are successional and linked to fire, forming early- and mid-seral stages of bushlands and pyrophytic chaparral that replace oak woodlands and forests, and mixed-coniferous forests (M. Peinado pers. comm. 2014).

DISTRIBUTION

\*Geographic Range: This macrogroup occurs throughout Mediterranean California, fingering into southern Oregon and Baja California, Mexico.

Nations: MX, US

States/Provinces: CA, MXBC, OR

USFS Ecoregions (2007) [optional]: 242B:??, 261B:CC, 262A:CC, 263A:CC, 322A:PP, 322C:PP, M242A:PP, M242B:PP, M261A:CC, M261B:CC, M261C:CC, M261D:CC, M261E:CC, M261F:CC, M261G:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G257 | Californian Xeric Chaparral |
| G261 | Californian Mesic & Pre-montane Chaparral |
| G258 | Californian Maritime Chaparral |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Chaparral | Barbour et al. 2007a | Chapter 13 |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel, M.S. Reid and T. Keeler-Wolf

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.1.Na. Californian Scrub & Grassland

M044. Californian Coastal Scrub

Type Concept Sentence: California coastal scrub consists of a diverse mix of drought-deciduous shrubs and characteristic obligate-seeding or resprouting evergreen shrubs occurring in coastal and foothill communities of southwestern Oregon, along the California coast and inner foothills, and south into Baja Norte, Mexico.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.1.Na. Californian Scrub & Grassland (D327)

Elcode: M044

\*Scientific Name: *Artemisia californica - Salvia mellifera - Baccharis pilularis* Coastal Scrub Macrogroup

\*Common (Translated Scientific) Name: Coastal Sagebrush - Black Sage - Coyotebrush Coastal Scrub Macrogroup

\*Colloquial Name: Californian Coastal Scrub

\*Type Concept: This is a diverse macrogroup, which ranges from southwestern Oregon, California coast and inner foothills, south into Baja Norte, Mexico; it also occurs on the off-shore islands. It is composed of mixed coastal shrublands dominated by drought-deciduous shrubs in the south or partially drought-deciduous shrubs in the central and northern areas, and at times characteristic (constant and sometimes dominant) obligate-seeding evergreen and resprouting, deep-rooted evergreen shrubs. Cold-deciduous shrubs can be dominant on cool, mesic north-facing slopes in some locations, especially further north. These shrublands are often called "soft" chaparral; while sometimes forming dense thickets, it is possible to navigate through them as the branches are forgiving. Diagnostic shrub species include *Artemisia californica, Baccharis pilularis, Ceanothus thyrsiflorus, Encelia californica, Eriodictyon californicum, Eriogonum cinereum, Eriogonum fasciculatum, Eriophyllum stoechadifolium, Gaultheria shallon, Isocoma menziesii, Lotus scoparius, Lupinus* spp., *Malacothamnus fasciculatus, Malacothamnus fremontii, Opuntia littoralis, Rubus ursinus, Salvia apiana, Salvia leucophylla, Salvia mellifera, Toxicodendron diversilobum*, and *Vaccinium ovatum*. The macrogroup generally occurs where the cooling influence of the Pacific Ocean moderates summer drought. The climate is seasonally wet, with most precipitation falling as rain between November and April). Landforms include coastal terraces, low to middle slopes, valley bottoms, coastal bluffs, and rock outcrops. Southern coastal scrub occurs below 1000 m (3300 feet) elevation and extends inland from the maritime zone in hotter, drier conditions than northern (less fog-drenched) shrublands (e.g., areas with 10-60 cm of annual precipitation). The more central and northern scrub extends inland in some areas to over 1500 m (4900 feet). Some of the inland distribution follows the corridors of marine influences of coastal fog or cool marine air where it is pushed inland by prevailing winds and in areas with steep slopes and disturbance. Soils vary from coarse gravels to clays but typically only support plant-available moisture with winter and spring rains. Generally, the shrublands in this macrogroup can become established following fire. However, they do not require fire for regeneration; they also occur on sites denuded by landslides, slumps, debris flows and other mass-wasting events.

\*Diagnostic Characteristics: This macrogroup consists of non-sclerophyll shrublands which range from strongly seasonal drought-deciduous species with evolutionary and ecological relationships to semi-desert species in the south, to hemi-sclerophyll evergreen mesophytic species in northern and protected central and southern portions of the coastal Mediterranean zone. These are drought-deciduous, partially drought-deciduous, and hemi-sclerophyll evergreen shrublands of the coast and foothills of California and southwest Oregon, with some evergreen sclerophyllous shrubs occurring within moister inland conditions and areas with inland coastal fogs. Diagnostic species include *Artemisia californica, Baccharis pilularis, Cleome isomeris, Encelia californica, Ericameria linearifolia, Eriodictyon californicum, Eriodictyon crassifolium, Eriogonum cinereum, Eriogonum fasciculatum var. foliolosum, Eriogonum fasciculatum var. fasciculatum, Eriophyllum stoechadifolium, Garrya elliptica, Gutierrezia californica, Isocoma menziesii, Lotus scoparius, Lupinus* spp., *Malacothamnus fasciculatus, Malacothamnus fremontii, Opuntia littoralis, Rubus ursinus, Salvia apiana, Salvia leucophylla*, and *Salvia mellifera*.

\*Classification Comments: This macrogroup includes a number of early-seral shrublands identified by Sawyer et al. (2009), dominated by species such as *Dendromecon rigida, Ericameria linearifolia, Ericameria palmeri, Eriodictyon californicum, Eriodictyon crassifolium, Frangula californica, Gutierrezia californica, Hazardia squarrosa, Isocoma menziesii, Lotus scoparius, Lupinus albifrons*, and *Malacothamnus fasciculatus*. The ecology/environmental parameters of these seral scrub types have lead toward a new seral scrub group in this macrogroup. The geographic range is broad as some of these seral scrub associations occur in the Sierra Nevada and Sierra Nevada foothills (along steep slopes, dry alluvial terraces, and areas where chaparral has recently burned), while others occur along rugged coastlines (J. Evens pers. comm. 2013).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M043 | Californian Chaparral | includes 1 or 2 groups that also occur along the coast and will occur adjacent to stands of this macrogroup, and at a stand-level may share some shrub species. |
| M050 | Southern Vancouverian Lowland Grassland & Shrubland | includes ~Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie Group (G488)$$. |
| M058 | Pacific Coastal Cliff & Bluff | needs to be further refined in concept to clearly distinguish it from M044. |
| M059 | Pacific Coastal Beach & Dune | includes ~Californian Coastal Beach & Dune Group (G663)$$, which includes more mesic shrub types. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Southern coastal sage scrub is dominated by drought-deciduous shrubs 0.5-2 m in height but at times can have characteristic (constant but not dominant) obligate-seeding evergreen and resprouting, deep-rooted sclerophyllous shrubs. The northern coastal scrub tends to have evergreen or partially drought-deciduous shrubs, sometimes prostrate. It is often called "soft" chaparral; while sometimes forming a dense thicket, it is possible to navigate through it as the branches are forgiving (Holland and Keil 1995, Ford and Hayes 2007). In some locations, cold-deciduous shrubs are dominant. Herbaceous taxa can range from low to moderate cover.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: In southern coastal scrub, the most predominant shrubs include *Artemisia californica, Encelia californica, Eriodictyon crassifolium, Eriogonum cinereum, Eriogonum fasciculatum, Malacothamnus fasciculatus, Opuntia littoralis, Salvia apiana, Salvia leucophylla*, and *Salvia mellifera*. Characteristic (constant but not dominant) resprouting, deep-rooted sclerophyllous shrubs include *Malosma laurina, Rhus integrifolia*, and *Rhamnus crocea*. More central and northern coastal scrub includes such species as *Baccharis pilularis, Ceanothus thyrsiflorus, Eriodictyon californicum, Eriophyllum stoechadifolium, Lupinus* spp., *Malacothamnus fremontii, Rubus ursinus, Toxicodendron diversilobum*, and *Vaccinium ovatum*. South of San Francisco Bay, the coastal scrub is similar in structure, but different in species composition. *Baccharis pilularis* is important, but associated shrub species include *Artemisia californica, Diplacus aurantiacus (= Mimulus aurantiacus), Eriophyllum confertiflorum*, and *Salvia* spp. This macrogroup includes a number of other, early-seral shrublands identified by Sawyer et al. (2009), dominated by species such as *Cleome isomeris (= Isomeris arborea), Dendromecon rigida, Ericameria linearifolia, Ericameria palmeri, Eriodictyon californicum, Gutierrezia californica, Hazardia squarrosa, Isocoma menziesii, Lotus scoparius, Lupinus albifrons, Malacothamnus fasciculatus*. For example, on recently disturbed sites, such as after fire, *Diplacus aurantiacus (= Mimulus aurantiacus), Lotus scoparius*, and *Lupinus albifrons* can be dominant across this macrogroup's range. The exotics *Carpobrotus chilensis* and *Carpobrotus edulis* can have high cover in some coastal areas.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Shrublands in this macrogroup can become established following fire. However, they do not require fire for regeneration. In southern coastal sage scrub, fire frequency was historically low, but in recent years, with adjacency to urban and suburban areas, the fire frequency has increased (e.g., a result of arson or cigarette ignition) resulting in type conversion to non-native and ruderal annual grasslands and early-seral types. *Malosma laurina* and *Rhus integrifolia* are also increasing in abundance because they can continually resprout after repeated fires. In places, *Opuntia littoralis* may proliferate and cover entire slopes in dry rocky areas with low-intensity repeated fires that have killed the scrub taxa, while *Opuntia littoralis* can resprout and spread to cover large patches. Coastal scrub also can occupy sites denuded by landslides, slumps, debris flows, and other mass wasting events. It sometimes occupies chaparral sites for a number of years after a burn, before the larger, woodier chaparral shrubs reestablish their dominance. The main sage scrub species have seeds that are wind and gravity dispersed, and recovery of sage scrub communities post-disturbance may involve dispersal and germination from plants outside the disturbed area (Rundel 2007).

*Baccharis pilularis* is a vigorous, short-lived species which can form dense even-aged stands. It may serve as a nurse plant for native grasses as well as coastal live oak (*Quercus agrifolia*). When a *Baccharis pilularis* individual dies, live oak seedlings are released from competitive suppression. Early seral stands may form on disturbed sites such as roadsides, levees, and sites of recent landslides. Little has been published on the fire ecology of *Baccharis pilularis*. It resprouts after fire and the smallest individuals produce most of the sprouts. Its seeds are wind-dispersed; thus, seedlings can be abundant after fire, even if this species had low pre-burn cover (Borchert et al. 2004).

ENVIRONMENT

Environmental Description: The macrogroup generally occurs where the cooling influence of the Pacific Ocean moderates summer drought. The climate is seasonally wet, with most precipitation falling as rain between November and April. Found on coastal terraces, low to middle slopes, valley bottoms coastal bluffs, and rock outcrops, generally on rocky or gravelly soils, often windy. Southern coastal scrub occurs below 1000 m (3300 feet) elevation and may extend inland from the maritime zone in hotter, drier conditions (less fog-drenched) than northern shrublands (e.g., areas with 10-60 cm of annual precipitation) (Rundel 2007). The more northern scrub extends inland in California in the vicinity of San Francisco Bay, the margins of the Sacramento-San Joaquin delta and up the Sierra Nevada foothills and North Coast Range and Klamath Range foothills to over 1500 m (4900 feet). This inland distribution follows the corridors of marine influences of coastal fog or cool marine air where it is pushed inland by prevailing winds (Ford and Hayes 2007) and in areas with steep slopes and disturbance. Soils vary from coarse gravels to clays but typically only support plant-available moisture with winter and spring rains.

DISTRIBUTION

\*Geographic Range: This macrogroup is found from southwestern coastal Oregon, along the California coast and foothills, south into Baja Norte, Mexico. It also occurs on the coastal islands of California and Baja, generally below 1000 m (3300 feet) elevation and may extend inland (and over 1500 m [4920 feet] in elevation) from the maritime zone.

Nations: MX, US

States/Provinces: CA, MXBC, OR

USFS Ecoregions (2007) [optional]: 261B:CC, 262A:CC, 263A:CC, M261B:PP, M262A:PP

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G782 | Californian Coastal-Foothill Seral Scrub |
| G264 | Central & Southern Californian Coastal Sage Scrub |
| G662 | Californian North Coastal & Mesic Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | 133.2 Californian Coastalscrub | Brown 1982a |  |
| < | Central (Lucian) Coastal Scrub (#32200) | Holland 1986b |  |
| < | Coastal Sage Shrub (205) | Shiflet 1994 |  |
| = | Coastal Scrub (#32000) | Holland 1986b |  |
| < | Coastal sage scrub | Munz and Keck 1949 |  |
| < | Northern (Franciscan) Coastal Scrub (#32100) | Holland 1986b |  |
| < | Northern Coastal Scrub | Ford and Hayes 2007 |  |
| < | Northern coastal scrub | Munz and Keck 1949 |  |
| < | Sage Scrub | Rundel 2007 |  |
| < | Venturan Coastal Sage Scrub (#32300) | Holland 1986b |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: R.F. Holland (1986b); P.A. Munz and D.D. Keck (1949)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: T. Keeler-Wolf, M.S. Reid, and J. Evens

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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Shiflet, T. N., editor. 1994. Rangeland cover types of the United States. Society for Range Management. Denver, CO. 152 pp.

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2. Shrub & Herb Vegetation

2.B.1.Na. Californian Scrub & Grassland

M045. Californian Annual & Perennial Grassland

Type Concept Sentence: This macrogroup consists of native perennial and annual forb- and grass-dominated meadows and grasslands of California from the coast to the upper foothills of the Sierra Nevada, dominated or characterized by native perennial bunchgrass *Nassella* spp., and/or perennial forbs such as *Brodiaea, Calochortus, Dichelostemma, Sanicula*, and *Triteleia* spp., annual species such as *Amsinckia* spp., *Eschscholzia* spp., *Lotus unifoliolatus, Lupinus* spp., *Plagiobothrys nothofulvus, Trifolium variegatum*, and *Vulpia microstachys*. Occurrences often have high native species richness though they may have significant abundance of non-native species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.1.Na. Californian Scrub & Grassland (D327)

Elcode: M045

\*Scientific Name: *Nassella pulchra - Brodiaea elegans - Plagiobothrys nothofulvus* Native Grassland Macrogroup

\*Common (Translated Scientific) Name: Purple Needlegrass - Harvest Brodiaea - Rusty Popcorn-flower Native Grassland Macrogroup

\*Colloquial Name: Californian Annual & Perennial Grassland

\*Type Concept: This macrogroup includes the now relictual native perennial grasslands, native annual grasslands and native annual forb meadows of California. Characteristic native plant species include a dominance by native, cool-season bunchgrasses *Agoseris heterophylla, Aristida* spp., *Bromus carinatus, Elymus glaucus, Festuca californica, Festuca idahoensis, Leymus condensatus, Melica californica, Nassella cernua, Nassella lepida, Nassella pulchra*, and *Poa secunda*. Native annual species include *Amsinckia* spp., *Eschscholzia* spp., *Lotus unifoliolatus, Lupinus* spp., *Plagiobothrys nothofulvus, Trifolium variegatum*, and *Vulpia microstachys*. Occurrences often have high native species richness, though many now have significant abundance of non-native species. Historically, native perennial grasslands were common among oak savanna and woodland and probably experienced similar frequent fire regimes. Today they are limited to small relictual, remnant and restored stands. These communities are best represented on xeric to mesic ultramafic sites where alien annual grasses are less well-adapted. This macrogroup occurs in Mediterranean California from 10-1200 m (30-3600 feet) elevation, with cool, wet winters and hot, dry summers, receiving on average 50 cm (range 25-100 cm) of precipitation per year, mainly as winter rain. It is found with fine-textured soils, moist or even waterlogged in winter, but very dry in summer.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M046 | Californian Ruderal Grassland, Meadow & Scrub | is dominated completely by non-native herbaceous species; a few natives may be present but are in such low abundance that the natural analog cannot be determined even by experts. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Herbaceous grasslands and meadows dominated by perennial bunchgrasses, and/or annual grasses and forbs, less than 2 m in height.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Stands have a characteristic presence of native perennial grasses and/or diagnostic native annual grasses or forbs. In bunchgrass grasslands, *Nassella pulchra, Nassella cernua*, or *Nassella lepida* is dominant or characteristically present in the herbaceous layer with other annual or perennial species such as *Agoseris heterophylla, Aristida* spp., *Bromus carinatus, Elymus glaucus, Festuca californica, Festuca idahoensis, Leymus condensatus, Melica californica*, and *Poa secunda (= Poa scabrella)*. Annual grasslands have a wide variation in the abundance of native species, both spatially and temporally as seed banks respond to temperature and rainfall events which trigger germination. Characteristic annual species include *Amsinckia menziesii, Amsinckia tessellata, Eschscholzia californica* (sometimes perennial but iconic and conspicuous), *Eschscholzia lobbii, Centromadia pungens, Lasthenia californica, Lasthenia gracilis, Layia* spp., *Lotus unifoliolatus (= Lotus purshianus), Lupinus* spp., *Madia elegans, Monolopia* spp., *Phacelia* spp., *Plagiobothrys nothofulvus, Plantago erecta, Trifolium variegatum*, and *Vulpia microstachys (= Festuca microstachys)*. Non-native species can include *Avena barbata, Avena fatua, Bromus hordeaceus, Bromus rubens, Lolium perenne*, and others.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Perennial grasslands were frequently burned and historically the fire interval was thought to be every 1-3 years. Annual grasslands and forblands are spatially and temporally variable in size and richness from year to year depending on winter temperatures and the amount and timing of winter to spring precipitation. Revisit analyses show that some annual types are more stable than others with the most variation seen across drought years in the semi-arid grasslands of the San Joaquin Valley (Buck-Diaz et al. 2013). Other factors include the amount of soil tillage by native fossorial mammals. Exotic and invasive species competitively impact native species abundance. Management through burning, native wildlife or livestock grazing, or other methods is often necessary to reduce non-native species pressures and maintain characteristic presence of natives.

ENVIRONMENT

Environmental Description: These grasslands occur on bluff, valley and foothill locations on all topographic locations. Soils range from deep, well-drained, fine-textured loams with high clay content, to more shallow and rocky soils. Elevation ranges from sea level to 1700 m. Grasslands on serpentine-rich parent material occur on deep serpentinite soils and can be very moist to dry. Some stands occur in more mesic settings such as seasonal to intermittently flooded alluvial flats and stream terraces, or at the edges of vernal pools, in swales, seeps, and moist grassy flats.

DISTRIBUTION

\*Geographic Range: This macrogroup is found throughout Mediterranean California from sea level to ~300 m (0-1000 feet) elevation.

Nations: MX?, US

States/Provinces: CA

USFS Ecoregions (2007) [optional]: 261B:CC, 262A:CC, M261A:CP, M261B:CC, M261C:CP, M261E:CC, M261F:C?

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G766 | Californian Annual Grassland & Forb Meadow |
| G496 | Californian Perennial Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2015-12-10 | M889 Californian Ruderal Scrub Macrogroup | M889 merged into M045 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Coastal Prairie | Barbour and Major 1988 |  |
| > | Coastal Prairie | Barbour et al. 2007a |  |
| > | Coastal Prairie (214) | Shiflet 1994 | The native bunchgrass grasslands part corresponds with this group. |
| > | Valley Grassland (215) | Shiflet 1994 | The native bunchgrass grasslands part corresponds with this group. |
| > | Valley Grassland and Annual Grassland | Barbour et al. 2007a |  |
| > | Valley Grassland and Annual Grassland | Barbour and Major 1988 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M.G. Barbour, T. Keeler-Wolf and A.A. Schoenherr (2007a)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel, P. Comer, T. Keeler-Wolf, M.S. Reid

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2.B.2. Temperate Grassland & Shrubland

Temperate Grassland, Meadow & Shrubland is dominated by perennial grasses, forbs and shrubs typical of moderately dry to moist habitats and is found in the mid-latitude regions of all continents (23° to 55°N and S), varying from large open grassland landscapes to droughty hillside meadows in forested landscapes.

2. Shrub & Herb Vegetation

2.B.2.Ek. Pampean Grassland & Shrubland

D141. Pampean Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.2.Ek. Temperate Grassland & Shrubland (F012)

Elcode: D141

\*Scientific Name: Pampean Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Pampean Grassland & Shrubland Division

\*Colloquial Name: Pampean Grassland & Shrubland

\*Type Concept: The South American Campos or Pampas is a very extensive subtropical/temperate grassland region lying between 24° and 35°S covering an area of approximately 500,000 square km. The term Campos refers to grasslands or pastures with a vegetation cover comprising mainly grasses and herbs; scattered small shrubs and trees are occasionally found, generally by the banks of streams.

Range: Includes parts of southern Brazil, southern Paraguay and northeastern Argentina , and the whole of Uruguay.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M392 | Semi-Arid Pampa Grassland & Shrubland |
| M748 | Humid Pampa Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.2.Ek. Pampean Grassland & Shrubland

M392. Semi-Arid Pampa Grassland & Shrubland

Type Concept Sentence: Grasslands of the central and western portions of the Argentinian Pampa plains, with vegetation communities adapted to sandy substrates derived from old eolic sand deposits. This highly drained substrate and the semi-arid climate results in a grassland dominated by *Ambrosia tenuifolia, Andropogon ternatus, Cenchrus incertus, Elionurus muticus, Hyalis argentea, Jarava brachychaeta, Nassella trichotoma, Panicum urvilleanum, Spartina coarctata*, and *Sporobolus rige*. A scrub stratum of thorny and microphyllous species of *Prosopis* and *Acacia* develops in conditions of less disturbance. This vegetation community also occurs on uplands (dunes) and intervening swales (which often are saline).

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Ek. Pampean Grassland & Shrubland (D141)

Elcode: M392

\*Scientific Name: Semi-Arid Pampa Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Semi-Arid Pampa Grassland & Shrubland Macrogroup

\*Colloquial Name: Semi-Arid Pampa Grassland & Shrubland

\*Type Concept: This macrogroup represents the grasslands located in the central and western portions of the Argentinian Pampa plains, with vegetation communities adapted to sandy substrates which remain from old eolian sand deposits. This highly drained substrate, combined with a semi-arid climate with annual precipitation around 600 mm or less, results in a grassland cover of 50-70%, up to 1 m tall, which in conditions of less disturbance can develop a scrub stratum of thorny and microphyllous species of *Prosopis* and *Acacia*. This macrogroup includes the vegetation communities of the topographic uplands (dunes) and the swales in between which in some cases have a slight saline property. Characteristic species are *Jarava brachychaeta, Nassella trichotoma, Elionurus muticus, Hyalis argentea, Panicum racemosum, Panicum urvilleanum, Poa lanuginosa, Spartina coarctata, Sporobolus rige, Ambrosia tenuifolia, Andropogon ternatus, Cenchrus spinifex (= Cenchrus incertus, = Cenchrus pauciflorus), Conyza bonariensis, Eragrostis lugens, Eryngium horridum, Facelis retusa, Glandularia peruviana, Gnaphalium gaudichaudianum, Hypochaeris pampasica, Jarava plumosa (= Stipa papposa), Lathyrus pubescens var. pubescens, Nassella neesiana (= Stipa neesiana), Oenothera odorata, Pfaffia gnaphaloides, Plantago patagonica, Senecio ceratophylloides, Solanum sisymbrifolium, Thelesperma megapotamicum, Veronica peregrina, Vicia graminea var. graminea*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.2.Ek. Pampean Grassland & Shrubland

M748. Humid Pampa Grassland & Shrubland

Type Concept Sentence: Warm, temperate, humid grasslands of Argentina and Uruguay distributed around the Rio de la Plata and the lower reaches of the Parana and Uruguay rivers covering the region known as the Pampas. Includes grasslands of the Argentinian Mesopotamian parkland to the northwest and bounded by the Espinal region along the southern and western margins. These mesic grasslands are distributed on both the fertile, loessic soils characteristic of the eastern Argentinian Pampas and on other varied substrates common in the Uruguayan Pampas. Gradients in soil fertility, composition, and drainage allow for several distinct grassland communities to coexist. The dominant genera are *Nassella* and *Jarava*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Ek. Pampean Grassland & Shrubland (D141)

Elcode: M748

\*Scientific Name: Humid Pampa Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Humid Pampa Grassland & Shrubland Macrogroup

\*Colloquial Name: Humid Pampa Grassland & Shrubland

\*Type Concept: Warm temperate, humid grasslands of Argentina and Uruguay distributed around the Rio de la Plata and the lower reaches of the Parana and Uruguay rivers, covering the region known as Pampas, including the grasslands of the Argentinian Mesopotamian parkland to the northwest and bounded by the Espinal region along the southern and western margins. The macrogroup includes the mesic grasslands distributed on both the fertile, loessic soils characteristic of the eastern Argentinian Pampas and on other varied substrates common in the Uruguayan Pampas, as well as those of the hills of Tandil and Ventana in the southern portion of the Pampas region. They have in common a mesic climate, with interannual variations in precipitation, well-drained soils and a gradient of topographical positions between depressions and ridges measured mostly in centimeters only. The gradients in soil fertility, composition and drainage allow for several distinct grassland communities to coexist, some of them more diverse than others, with other herbs or small shrubs intermingled. The dominant genera are *Nassella* and *Jarava (= Stipa), Piptochaetium*, and *Poa*. Distributions farther north like the Mesopotamia region include megathermic C4 grass genera such as *Bothriochloa, Digitaria, Paspalum, Schizachyrium*, and *Andropogon* and *Paspalum* in Uruguay. The communities have 50-100% cover and vary from 0.5-2 m high.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G590 | Pastizales Sobre Suelos Bien a Moderadamente Drenados de la Pampa Austral |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M355 Southern Chaco Shrubland & Savanna (Espinal) Macrogroup | M355 reconfigured into M748 & M780 |
| 2013-01-17 | M391 Humid Pampas Grassland (Pradera de mesofitas y Pradera Humeda de mesofitas) Macrogroup | M391 & part of M355 reconfigured into M748 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.2.Eo. Patagonian Grassland & Shrubland

D144. Patagonian Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.2.Eo. Temperate Grassland & Shrubland (F012)

Elcode: D144

\*Scientific Name: Patagonian Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Patagonian Grassland & Shrubland Division

\*Colloquial Name: Patagonian Grassland & Shrubland

\*Type Concept: Patagonia lies between 39° and 55°S, partly in Chile but mainly in Argentina; its extra-Andean portion is treeless semi-arid grass- and shrub-steppes that have been grazed by domestic livestock for a little over a century. The climate is arid to semi-arid, and cool to cold. This region is dominated by graminoids with distribution further north in the Andes (*Festuca, Stipa, Poa, Deyeuxia*) and other species such as *Nassauvia axillaris, Senecio filaginoides*, in addition to a series of endemic genera.

Range: Southern Chile and Argentina.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M749 | Patagonian Dry Grassland & Shrubland |
| M750 | Patagonian Mesic Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.2.Eo. Patagonian Grassland & Shrubland

M749. Patagonian Dry Grassland & Shrubland

Type Concept Sentence: Steppe communities that occupy the majority of the Patagonian territory in Argentina. Vegetation cover is 10-20%, and height is less than 0.8 m. Distributed on plateaus from near sea level to 1000 m elevation. Vegetation is dominated by short, sclerophyllous shrubs (*Nassauvia glomerulosa, Nassauvia ulicina*, and *Nassauvia axillaris*), forming different associations with psammophilous (*Stipa humilis* and *Stipa chrysophylla*) or halophilous species (*Chuquiragua aurea, Frankenia patagonica*, and *Atriplex sagittifolia*). Pioneer communities dominated by *Junellia tridens* are also included.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Eo. Patagonian Grassland & Shrubland (D144)

Elcode: M749

\*Scientific Name: Patagonian Dry Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Patagonian Dry Grassland & Shrubland Macrogroup

\*Colloquial Name: Patagonian Dry Grassland & Shrubland

\*Type Concept: Steppe communities in this macrogroup occupy the majority of the Patagonia territory in Argentina and are characterized as xeric not only because of the extended dry periods they are adapted to, but also because of the effects of strong and cold drying winds in the areas where these grow and the species adaptations to cope with such extreme conditions. These steppes are dominated by the short, sclerophyllous shrub of the Asteraceae family, including *Nassauvia glomerulosa, Nassauvia ulicina*, and *Nassauvia axillaris*, forming different associations. These steppes have only between 10-20% vegetation cover and are no taller than 0.8 m. They are distributed on plateaus from 1000 m elevation to near the Atlantic Coast. Some of the associated species are psammophilous (*Stipa humilis* and *Stipa chrysophylla*) or halophilous (*Chuquiragua aurea, Frankenia patagonica*, and *Atriplex sagittifolia*), which is indicative of the environmental setting. *Berberis heterophylla, Acaena, Azorella, Senecio, Adesmia*, and *Festuca* species are characteristic accompanying species of these steppes. Communities dominated by *Junellia tridens* are also included in this macrogroup and they are typical pioneer communities occupying degraded areas. *Junellia* shrubs grow low to the ground, reaching about 60 cm, rarely over 1 m, and they facilitate the establishment of tuft grasses of *Carex patagonica*, as well as other species such as *Vicia pampicola, Lathyrus magellanicus, Adesmia villosa*, etc.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-03-26 | M399 Patagonian Steppe Macrogroup | M400 & M399 replaced by M749 & M750 |
| 2013-03-26 | M400 Patagonian Grassland Macrogroup | M400 & M399 replaced by M749 & M750 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.2.Eo. Patagonian Grassland & Shrubland

M750. Patagonian Mesic Grassland & Shrubland

Type Concept Sentence: Mesic grasslands of the southern Andes. One type, *Festuca pallescens* grassland, grows on the foothills of the Andes in Chile and Argentina. Occurs in Argentinian Patagonia, forming a western fringe from Neuquen to Santa Cruz. Does not occur further east in Patagonia nor in Tierra del Fuego because of the drier conditions there. Accompanying species are *Bromus setifolius, Festuca argentina, Mulinum spinosum*, and *Triptilion achillae*. Also included are grasslands that replace the logged montane humid evergreen and deciduous forests of the temperate southern Andes, composed of *Agropyron fueguianum, Bromus coloratus, Elymus antarcticus, Festuca gracillima*, and *Gamochaeta nivalis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Eo. Patagonian Grassland & Shrubland (D144)

Elcode: M750

\*Scientific Name: Patagonian Mesic Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Patagonian Mesic Grassland & Shrubland Macrogroup

\*Colloquial Name: Patagonian Mesic Grassland & Shrubland

\*Type Concept: This macrogroup represents several communities of mesic grasslands of the southern Andes. One of them, the *Festuca pallescens* grassland, grows on the foothills of the west and east slopes in Chile and Argentina. In the Argentinian Patagonia it is distributed forming a western fringe from Neuquen to Santa Cruz. It does not occur further east in Patagonia because the drier conditions favor other communities, nor does it go into Tierra del Fuego. Accompanying species are *Festuca argentina, Bromus setifolius, Triptilion achillae, Mulinum spinosum*. Another type is formed by grasslands of *Poa ligularis* growing on the Somuncura plateau, above 1200 m elevation in the Rio Negro province; associated species are *Stipa humilis, Maihuenia patagonica, Junellia spisa*, among others. Also included here are grasslands that replaced the logged montane humid evergreen and deciduous forests of the temperate southern Andes. These communities are composed of *Festuca gracillima, Gamochaeta nivalis, Agropyron fueguianum, Elymus antarcticus, Bromus coloratus, Luzula chilensis, Azorella trifurcata, Baccharis magellanica, Silene magellanica, Armeria elongata, Arjona tuberosa, Geranium magellanicum, Chiliotrichum diffusum, Stipa humilis*, and *Lepidophyllum cupressiformis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-03-26 | M399 Patagonian Steppe Macrogroup | M400 & M399 replaced by M749 & M750 |
| 2013-03-26 | M400 Patagonian Grassland Macrogroup | M400 & M399 replaced by M749 & M750 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.2.Nb. Central North American Grassland & Shrubland

D023. Central North American Grassland & Shrubland

Type Concept Sentence: This division is found in the central plains of North America, and is dominated by grassland vegetation commonly referred to as shortgrass, mixedgrass and tallgrass prairie, interspersed with evergreen and deciduous shrublands. The vegetation occurs on either glaciated or non-glaciated substrates, rolling to rugged topography, and fine-textured to coarse-textured soils, and natural disturbances include grazing and fire.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.2.Nb. Temperate Grassland & Shrubland (F012)

Elcode: D023

\*Scientific Name: *Andropogon gerardii - Pascopyrum smithii - Bouteloua gracilis* Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Big Bluestem - Western Wheatgrass - Blue Grama Grassland & Shrubland Division

\*Colloquial Name: Central North American Grassland & Shrubland

\*Type Concept: The division consists of grassland vegetation, which is often the regional matrix type, with interspersed shrublands. The occurrence and abundance of shrubs is a product of several factors, including geology and soils, natural and altered disturbance regimes, and land use. Species composition is also regulated by two major environmental gradients: an east-to-west precipitation gradient and a north-to-south temperature gradient. Plant height and stature vary with available moisture, with shortgrass prairie species (e.g., *Bouteloua dactyloides* and *Bouteloua gracilis*) dominating in the southwestern extent of the division, mixed grasses (e.g., *Festuca altaica, Hesperostipa comata, Hesperostipa curtiseta, Koeleria macrantha, Muhlenbergia torreyi, Nassella leucotricha, Panicum virgatum, Pascopyrum smithii, Schizachyrium scoparium*) in the central region and tallgrass prairie species (*Andropogon gerardii, Panicum virgatum*, and *Sorghastrum nutans*) in the east. The occurrence and prevalence of woody species is often a product of reduced fire frequency and enhanced grazing pressure. Woody species dominant in the shrublands can be either or both evergreen or deciduous, including *Juniperus* spp., *Prunus* spp., *Quercus* spp., *Rhus* spp., and *Rosa* spp. Associated graminoid and forb species in the shrublands are also found in the surrounding grasslands. Soils are predominantly Mollisols, that range from well-drained, sandy to loamy-sand, and clay loams. On sandy soils, *Andropogon hallii, Sporobolus cryptandrus*, and *Artemisia filifolia* predominate.

\*Diagnostic Characteristics: This division is represented by physiognomic types such as bunchgrasses, sod-forming grasses, and woody plants of dwarf or stunted stature. There is a wide suite of diagnostic species, that, though they are often shared with other divisions, are particularly dominant and widespread in this region. Diagnostic graminoids include *Andropogon gerardii, Andropogon hallii, Aristida purpurea, Bouteloua curtipendula, Bouteloua gracilis, Bouteloua hirsuta, Bouteloua dactyloides, Calamagrostis canadensis, Festuca altaica, Festuca hallii, Panicum virgatum, Pascopyrum smithii, Pseudoroegneria spicata, Schizachyrium scoparium, Sorghastrum nutans, Spartina pectinata, Sporobolus cryptandrus*, and *Sporobolus heterolepis*. Woody species include *Artemisia filifolia, Artemisia frigida, Juniperus horizontalis, Juniperus virginiana, Cylindropuntia imbricata, Prosopis glandulosa, Prunus angustifolia, Prunus virginiana, Quercus havardii*, and *Rhus aromatica*. Further work is needed to identify diagnostic forbs.

\*Classification Comments: We refer to this division as Central North American rather than Great Plains, because the tallgrass prairie is not strictly Great Plains, and the prairie peninsula extends eastward to Illinois, Michigan, and even Ohio and southwestern Ontario. We largely use the term Great Plains in the narrower sense of encompassing shortgrass and mixedgrass prairies. We treat the "tree savannas" with forests and woodlands.

Overgrazing and fire suppression significantly impact the species composition of vegetation types in this division. Overgrazing may cause northern mixedgrass prairies to resemble shortgrass vegetation. Fire suppression typically leads to shrub and tree invasion.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D008 | Eastern North American Forest & Woodland |  |
| D326 | North American Great Plains Forest & Woodland |  |
| D024 | Eastern North American Grassland & Shrubland |  |
| D022 | Western North American Grassland & Shrubland |  |
| D102 | Southeastern North American Grassland & Shrubland |  |
| D323 | Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: In open grasslands, physiognomy ranges for from short-statured grasses (*Buchloe dactyloides* and *Bouteloua gracilis*) in the west to mixed grasses (e.g., *Festuca altaica, Hesperostipa comata, Hesperostipa curtiseta, Koeleria macrantha, Muhlenbergia torreyi, Nassella leucotricha, Panicum virgatum, Pascopyrum smithii, Schizachyrium scoparium*) in the central region and tall grasses (*Andropogon gerardii* and *Sorghastrum nutans*) in the east. Dominant grasses may exhibit either bunch or sod-forming tendencies, which may be widely dispersed or growing densely. The height of grasses is influenced by slope, soils, and aspect. The species composition and dominance of native grasses is a function of latitude, with C3 grass species predominating at higher latitudes and C4 at lower latitudes. Regionally, species composition is a product of soil texture. For example, *Bouteloua curtipendula* and *Bouteloua hirsuta* predominate on coarse soils, whereas *Buchloe dactyloides* is more abundant on clay soils. On deep, sandy soils, for example, grass cover might be sparse and shrubs such as *Artemisia filifolia, Prunus angustifolia*, and *Rhus aromatica* predominate. The proportion of shrubs to graminoids is a product of land use and/or substrate. Woody species are typically short-statured or stunted individuals, ranging in height from 0.3 to 3 m. Predominant woody taxa can be either evergreen or deciduous.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The families Asteraceae, Fabaceae, and Poaceae predominate in this division. Common and predominant grasses include *Achnatherum hymenoides, Andropogon gerardii, Andropogon hallii, Aristida purpurea, Bouteloua curtipendula, Bouteloua gracilis, Bouteloua hirsuta, Bothriochloa laguroides ssp. torreyana, Bouteloua dactyloides, Calamagrostis canadensis, Calamagrostis stricta, Calamovilfa gigantea, Calamovilfa longifolia, Festuca altaica, Festuca hallii, Hesperostipa comata, Hesperostipa curtiseta, Koeleria macrantha, Muhlenbergia torreyi, Nassella leucotricha, Panicum virgatum, Pascopyrum smithii, Paspalum plicatulum, Pleuraphis jamesii, Pleuraphis mutica, Poa pratensis, Pseudoroegneria spicata, Schizachyrium scoparium, Sorghastrum nutans, Spartina pectinata, Sporobolus airoides, Sporobolus compositus, Sporobolus cryptandrus, Sporobolus heterolepis*, and *Tripsacum dactyloides*. Other graminoids include *Carex filifolia, Carex inops ssp. heliophila*, and *Carex meadii*.

Forb species richness is high in this division and includes, but is not limited to, species such as *Ambrosia psilostachya, Amphiachyris dracunculoides, Artemisia frigida, Astragalus mollissimus, Comandra umbellata, Dalea purpurea, Echinacea angustifolia, Engelmannia peristenia, Eryngium yuccifolium, Erysimum capitatum, Euphorbia corollata, Fragaria virginiana, Gaura coccinea, Helianthus grosseserratus, Helianthus pauciflorus, Liatris pycnostachya, Liatris spicata, Lygodesmia juncea, Melampodium leucanthum, Machaeranthera tanacetifolia, Oligoneuron rigidum, Parthenium integrifolium, Phlox pilosa, Ratibida pinnata, Silphium laciniatum, Silphium integrifolium, Silphium terebinthinaceum, Sphaeralcea coccinea, Symphyotrichum ericoides*, and *Thelesperma megapotamicum*.

Woody plant species include *Amelanchier alnifolia, Amorpha canescens, Artemisia cana, Artemisia filifolia, Artemisia frigida, Artemisia tridentata, Atriplex canescens, Ceanothus americanus, Dalea formosa, Dasiphora fruticosa ssp. floribunda, Juniperus ashei, Juniperus horizontalis, Juniperus pinchotii, Juniperus virginiana, Juniperus horizontalis, Mimosa borealis, Cylindropuntia imbricata (= Opuntia imbricata), Opuntia polyacantha, Opuntia phaeacantha, Prosopis glandulosa, Prunus angustifolia, Prunus virginiana, Quercus havardii, Rhus aromatica, Rosa arkansana, Rosa carolina, Symphoricarpos orbiculatus, Symphoricarpos occidentalis*, and *Yucca glauca*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Historically, vegetation dynamics were driven by fire, grazing and drought. The importance of these factors differs from east to west. For example, fire is considered more important in the humid eastern portion of the division where high levels of precipitation result in the accumulation of biomass. In the absence of fire, thatch build-up can suppress species richness and favor predominant grasses. In the semi-arid west, however, biomass accumulation is limited by low annual precipitation. Fire and grazing have been substantially altered since Euro-American settlement. These factors, in concert, affect the proportion of woody species relative to grasses in given locales. Bison, historically the large herbivore in grasslands, has been replaced by domesticated cattle, and fire frequencies have been greatly altered. This and the replacement of native grasses with non-native pasture grasses have contributed to the increased abundance of woody plants in much of the region.

ENVIRONMENT

Environmental Description: *Climate:* The division occurs within three climate types (sensu Trewartha): Temperate Continental, Dry Steppe (semi-arid), and Subtropical humid. As a result, there are distinct gradients of precipitation and temperate within the division. The precipitation gradient extends along an east-to-west axis, with an average annual precipitation of 1425 mm at Columbus, Ohio, 1083 mm in Columbia, Missouri, to a low of 477.5 mm at Boise City, Oklahoma. The western extent of the region is subject to periodic, often severe, droughts. The temperature gradient is strongest south-north. The annual average temperature in the southern extent of the division is 18.6°C (mean high of 25.7°C and a mean low 11.6°F) at San Angelo, Texas, to 3.1°C in Regina, Saskatchewan (a mean high of 18.9°C in July and a mean low of -14.7°C). The temperature gradient affects the ratio of species exhibiting the C3 to C4 photosynthetic syndromes in the flora, with a shift to C3 from south to north.

*Soils/substrate:* Although Mollisols predominate under grassland ecosystems, Entisols are common in much of the region, such as the Nebraska Sandhills. Alfisols, Vertisols and Inceptisols are present to a lesser extent. There is considerable variation in soil associations within these orders. Soil texture runs the gamut from fine-textured loams, clay loams, silty clays, and clays to coarse sandy and gravelly soils. Soil depth also ranges from deep, well-developed soils to shallow soils on rock outcrops. In the semi-arid western extent of the division, caliche is common as are gypsum-derived soils.

In the northern portion of division, glaciation during the Pleistocene and glacial till is a key component to soil development. In the High Plains, Ogallala Outwash, sediments and gravels deposited as a result of the Laramide Orogeny, contribute to the surface geology and soil development.

Topography ranges from gentle rolling to rugged, depending upon surface geology. Sandstone and limestone surface formations are common to the east of the High Plains. For example, red stone formations of Permian age are common in much of the region. These give way to Pennsylvanian sandstones in the east.

DISTRIBUTION

\*Geographic Range: This division extends on its western edge from the Rocky Mountains, from New Mexico to Alberta. Eastward, the core of the division occurs from Texas north to Manitoba, but its eastern extent forms a complex pattern with eastern deciduous forests, woodlands and savannas, particularly in the Midwest "prairie peninsula," where tallgrass prairie outliers extend as far east as Michigan, Ohio and extreme southwestern Ontario.

Nations: CA, MX, US

States/Provinces: AB, AR, CO, IA, IL, IN, KS, LA, MB, MI, MN, MO, MT, MXCH?, MXCO?, ND, NE, NM, OH, OK, ON, SD, SK, TX, UT, WI, WY

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M054 | Central Lowlands Tallgrass Prairie |
| M051 | Great Plains Mixedgrass & Fescue Prairie |
| M053 | Western Great Plains Shortgrass Prairie |
| M052 | Great Plains Sand Grassland & Shrubland |
| M158 | Great Plains Comanchian Scrub & Open Vegetation |
| M498 | Great Plains Ruderal Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Plains Grassland | Brown et al. 1998 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: B. Hoagland and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 08 Jan 2016

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2. Shrub & Herb Vegetation

2.B.2.Nb. Central North American Grassland & Shrubland

M054. Central Lowlands Tallgrass Prairie

Type Concept Sentence: This Great Plains tallgrass prairie macrogroup is dominated by a suite of tall and mid-height grasses and forbs, including the grasses *Andropogon gerardii, Panicum virgatum, Schizachyrium scoparium, Sorghastrum nutans, Sporobolus heterolepis*, and *Tripsacum dactyloides*. It is found over a range of moisture conditions on glaciated and unglaciated soils from Texas to Manitoba. Because of the relatively moist climate, the type is dependent on fire for maintenance of species richness and suppression of woody plant encroachment.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nb. Central North American Grassland & Shrubland (D023)

Elcode: M054

\*Scientific Name: *Andropogon gerardii - Sorghastrum nutans - Liatris spicata* Tallgrass Prairie Macrogroup

\*Common (Translated Scientific) Name: Big Bluestem - Indiangrass - Dense Blazingstar Tallgrass Prairie Macrogroup

\*Colloquial Name: Central Lowlands Tallgrass Prairie

\*Type Concept: This macrogroup encompasses tallgrass prairie grasslands occurring on glacial features and flat to rolling landscapes across North America from Texas to Manitoba where fire regularly occurs. It includes perennial grassland species and associated forb species across its range. Predominant grass species include *Andropogon gerardii, Panicum virgatum, Schizachyrium scoparium*, and *Sorghastrum nutans*. Northern mesic sites may also include *Sporobolus heterolepis* and *Muhlenbergia richardsonis*. Drier, rocky sites contain *Bouteloua curtipendula* and *Hesperostipa spartea*. Southward, dominants may also include *Tripsacum dactyloides* and *Paspalum plicatulum*. A wide diversity of forbs are present and even dominant, including *Achillea* spp., *Echinacea* spp., *Helianthus* spp., *Liatris* spp., *Lobelia spicata, Ratibida pinnata, Silphium* spp., *Solidago* spp., and *Symphyotrichum* spp. Woody species are rare but rockier sites may contain scattered trees tolerant of droughty conditions and periodic fire, such as *Quercus macrocarpa* and *Pinus banksiana*. A wide variety of forbs can contribute to the vegetation cover. Species composition varies geographically. Grazing and fire influenced species composition and distribution of this macrogroup historically, but a substantial reduction in fire frequency has allowed woody plants or other grasses to become dominant in many examples. Poor grazing practices can lead to soil erosion and invasion by cool-season grasses such as *Bromus inermis* and *Poa pratensis*. Much of this macrogroup has been converted to agriculture and very few unaltered examples persist in the current, highly fragmented landscape.

\*Diagnostic Characteristics: Tallgrass prairie typically dominated by the grasses *Andropogon gerardii, Panicum virgatum, Schizachyrium scoparium*, and *Sorghastrum nutans* with <10% tree and <25% shrub cover. Northward, mid-height associates include *Sporobolus heterolepis* and *Muhlenbergia richardsonis* along with native C-3 graminoids, such as *Carex* spp., *Dichanthelium* spp., and *Hesperostipa spartea*. Southward, dominants may also include *Tripsacum dactyloides* and *Paspalum plicatulum*. A suite of diagnostic forbs needs to be developed, including *Achillea* spp., *Echinacea* spp., *Helianthus* spp., *Liatris* spp., *Lobelia spicata, Ratibida pinnata, Silphium* spp., *Solidago* spp., and *Symphyotrichum* spp.

\*Classification Comments: This macrogroup (M054) includes sandy and rocky prairies in the northern and central Midwest but does not include the Sandhills or sand prairies in the western Great Plains, including states such as the Dakotas, Kansas or Nebraska. Those are covered by ~Great Plains Sand Grassland & Shrubland Macrogroup (M052)$$.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M012 | Central Midwest Oak Forest, Woodland & Savanna | can be very similar in its savanna portion but has >10% tree cover. |
| M151 | Great Plains Forest & Woodland |  |
| M051 | Great Plains Mixedgrass & Fescue Prairie |  |
| M052 | Great Plains Sand Grassland & Shrubland | can also be found on sand but tends to be dominated by *Andropogon hallii* and *Calamovilfa longifolia* and not *Andropogon gerardii, Sorghastrum nutans*, and *Panicum virgatum*. It is generally found further west than the sand/gravel portion of M012. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Tallgrass prairie is characterized by perennial C-4 grasses with flowering culms that reach heights of 2 m (6 feet) or more when they mature in late summer. Tallgrass prairie has the greatest number of native plant species of any of the mid-continent North American prairies. The very tall grasses are accompanied by numerous shorter grasses and many perennial forbs. Some stands are dominated by forbs (Woodward 2008).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Andropogon gerardii* is the characteristic tall sod-forming grass, with *Sorghastrum nutans*. *Schizachyrium scoparium* and *Sporobolus heterolepis* are common mid- to tall-sized bunchgrass associates. *Bouteloua curtipendula* is an important short bunchgrass on sandy or gravelly soils, or in Texas hay meadows occurring on deep clays. On wetter sites *Calamagrostis canadensis, Calamagrostis stricta, Panicum virgatum*, and *Spartina pectinata* can be abundant. Southward, dominants may also include *Tripsacum dactyloides* and *Paspalum plicatulum*. Forbs are very common and a wide variety can be found across the range of this macrogroup. Among these are *Achillea* spp., *Echinacea* spp., *Helianthus* spp., *Liatris* spp., *Lobelia spicata, Ratibida pinnata, Silphium* spp., *Solidago* spp., and *Symphyotrichum* spp. (Woodward 2008). An example of the diversity of forbs found in tallgrass prairie in central Illinois include the following: A suite of diagnostic forbs, ranking among dominants in Illinois prairies, would include *Comandra umbellata, Eryngium yuccifolium, Euphorbia corollata, Fragaria virginiana, Helianthus grosseserratus, Helianthus pauciflorus (= Helianthus rigidus), Liatris pycnostachya, Liatris spicata, Oligoneuron rigidum, Parthenium integrifolium, Phlox pilosa, Ratibida pinnata, Silphium laciniatum, Silphium integrifolium, Silphium terebinthinaceum*, and *Symphyotrichum ericoides* (J. Taft pers. comm. 2014). Scattered shrubs include *Amorpha canescens, Ceanothus americanus, Corylus americana*, and *Rosa carolina*. The actinorhizal shrub *Ceanothus americanus* has been shown to structure mesic tallgrass prairie (Taft and Dawson 2011).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Disturbance is necessary to maintain and rejuvenate stands of this macrogroup, because climatic conditions are suitable for the growth of trees and/or shrubs. Historically, fire, grazing, and periodic drought prevented woody species from displacing grassland vegetation and also provided a variety of conditions across the landscape fostering species richness (Anderson 1990b). The fire-return interval in the Central Tallgrass Prairie region has been estimated at 3-5 years (Wright and Bailey 1982b). This return interval, combined with the patchy nature of burned versus unburned areas affected by fires, are sufficient to suppress the expansion of woody species and promote a diverse assemblage of herbaceous species (Risser 1990). In Illinois, maximum species diversity is maintained by frequent fire (every 1-2 years) (Bowles and Jones 2013), but in other parts of the region, such frequent fires may lead to strong dominance by grasses. The dominant grasses also exhibit a compensatory growth response to clipping and/or burning, which could be in response to a nutrient flush (particularly in the form of potash) that follows a burn (Ehrenreich 1959). The removal of litter/mulch by fire also increases the exposed soil surface, allowing more light to reach the ground.

While shrub thickets locally are (were) part of the tallgrass prairie ecosystem, the widespread expansion of shrubs largely is an artifact of an altered fire regime resulting in reduced fire frequency and is one of the greatest management concerns and threats to biodiversity in the region of the tallgrass prairie (e.g., Briggs et al. 2005, Taft and Kron 2014).

ENVIRONMENT

Environmental Description: The climate of the bulk of the range of this macrogroup is interior continental, characterized by cold winters and hot summers. Mean January minimum temperatures range from below 0°F near the Canadian border to approximately 45°F on the Texas coast. Mean July maximum temperatures range from approximately 80°F near the Canadian border to 95°F in eastern Texas. Annual precipitation ranges from under 50 cm (20 inches) in the north to approximately 127 cm (50 inches) on the Gulf coast (PRISM Climate Group 2014). Late-spring and early-summer months have the most rain and, in the north, snowmelt adds to available moisture. Tallgrass prairie often grows on unconsolidated parent materials derived from glacial deposits and loess of Pleistocene age. Soils range from deep Mollisol and sandy/gravelly soils to thin, rocky soils. Grasslands on blackland Vertisols and sandy clay loam Alfisols in Texas and Gulf coastal prairies are also included in this macrogroup. The most common single soil type is Mollisols, which have deep horizons containing much humus from decaying plant material that often produces a dark blackish brown coloration. The deep roots of the grass and capillary action bring calcium carbonate up into the subsoil (B-horizon) and raise the pH to neutral or slightly basic levels. Distinct carbonate nodules do not usually form. True chernozems have formed in this part of the biome. A major exception to the characteristically deep soils occurs in the Flint Hills in eastern Kansas and Osage Hills in western Oklahoma, where rocky soils cover limestone in places. Shallow-soil prairies over limestone also occur commonly in western Missouri (Nelson 2005) and locally in northern Illinois (including gravel substrates). Prairies on deep sand deposits are present at several locations in the northern half of Illinois (Gleason 1910, Ebinger et al. 2006).

DISTRIBUTION

\*Geographic Range: Tallgrass prairie occurs in a band from southern Manitoba, Canada, south to the Gulf coast of Texas and includes the Prairie Peninsula, where annual precipitation is considerably more than 50 cm (20 inches) a year. Tallgrass prairie may once have covered 150,000 square km (400,000 square miles). Most prairie has long since vanished under the plow. Large tracts are uncommon; many reserves are less than 0.08 square km (20 acres) in size. Important remnants occur in the Loess Hills of western Iowa, the Prairie Coteau in eastern South Dakota, the Flint Hills in Kansas, Osage Hills in Oklahoma, Osage Plains in Kansas, and the Fort Worth Prairie in Oklahoma and Texas (Woodward 2008).

Nations: CA, MX?, US

States/Provinces: AR, IA, IL, IN, KS, LA, MB, MI, MN, MO, ND, NE, OH, OK, ON, SD, TX, WI

USFS Ecoregions (2007) [optional]: 212Ha:CCC, 212Hb:CCC, 212Hc:CCC, 212Hd:CCC, 212He:CCC, 212Hf:CCC, 212Hg:CCC, 212Hh:CCP, 212Hi:CCC, 212Hk:CCC, 212Hm:CCP, 212K:CP, 212M:CP, 212N:CP, 212Tb:CCC, 222H:CC, 222Ja:CCC, 222Jb:CCC, 222Jc:CCC, 222Je:CCC, 222Jf:CCP, 222Jg:CCC, 222Jh:CCC, 222Ji:CCP, 222K:CC, 222L:CC, 222M:CC, 222N:CC, 222R:CP, 222Ua:CCC, 222Ud:CCP, 222Ue:CCP, 223A:CC, 223G:CC, 232E:CC, 251A:CC, 251B:CC, 251C:CC, 251D:CC, 251E:CC, 251F:CC, 251H:CC, 255A:CC, 255B:CC, 255C:CC, 255D:CC, 255E:CC, 315E:CC, 332B:CC, 332C:CC, 332D:CC, 332E:CC, 332F:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G335 | Blackland & Coastal Tallgrass Prairie |
| G334 | Southern Tallgrass Prairie |
| G333 | Central Tallgrass Prairie |
| G075 | Northern Tallgrass Prairie |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Blackland Prairie (*Andropogon-Stipa*): 76 | Küchler 1964 | Küchler types 74, 76 and 77 are included in this macrogroup. |
| < | Bluestem Prairie (601) | Shiflet 1994 | Equivalent to M054 from North Dakota to Kansas and possibly into eastern Oklahoma. |
| < | Bluestem Prairie (710) | Shiflet 1994 | Equivalent to M054 in the Osage Hills of Oklahoma (southern Flint Hills). |
| < | Bluestem Prairie (*Andropogon-Panicum-Sorghastrum*): 74 | Küchler 1964 | Küchler types 74, 76 and 77 are included in this macrogroup. |
| < | Bluestem-Sacahuista Prairie (711) | Shiflet 1994 |  |
| < | Bluestem-Sacahuista Prairie (*Andropogon-Spartina*): 77 | Küchler 1964 | Küchler types 74, 76 and 77 are included in this macrogroup. |
| < | Coastal Prairie | Barbour and Billings 2000 | Coastal Prairie and Tallgrass Prairie equal M054. |
| < | Dry-mesic Prairie | Curtis 1959 |  |
| < | Flint Hills Tallgrass Prairie | Lauver et al. 1999 |  |
| < | Little Bluestem-Indiangrass-Texas Wintergrass (717) | Shiflet 1994 |  |
| < | Mesic Prairie | Curtis 1959 |  |
| = | Prairie | Weaver and Fitzpatrick 1934 | Simply called "true prairie," the authors provide one of the first detailed tallgrass prairie descriptions across the central region. |
| < | Tallgrass Prairie | Barbour and Billings 2000 | Coastal Prairie and Tallgrass Prairie equal M054. |
| = | True and Upper Coastal Prairie grassland | Diamond and Smeins 1988 |  |
| < | Wet-mesic Prairie | Curtis 1959 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.E. Weaver and T.J. Fitzpatrick (1934)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S. Menard, J. Drake, D. Faber-Langendoen, B. Hoagland, D. Diamond

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.2.Nb. Central North American Grassland & Shrubland

M051. Great Plains Mixedgrass & Fescue Prairie

Type Concept Sentence: The macrogroup is dominated by mixed grasses and scattered to moderately dense shrubs. It is found from northern Texas to southern Alberta across to southwest in the region between the tallgrass prairies to the east and the shortgrass prairies to the west. It occurs on both glaciated and non-glaciated substrates on a wide variety of landforms, and natural disturbances include grazing and fire.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nb. Central North American Grassland & Shrubland (D023)

Elcode: M051

\*Scientific Name: *Hesperostipa comata - Pascopyrum smithii - Festuca hallii* Grassland Macrogroup

\*Common (Translated Scientific) Name: Needle-and-Thread - Western Wheatgrass - Plains Rough Fescue Grassland Macrogroup

\*Colloquial Name: Great Plains Mixedgrass & Fescue Prairie

\*Type Concept: The macrogroup is dominated by mixed grasses and scattered to moderately dense shrubs. It is found from northern Texas to southern Alberta. The most common graminoid species occurring across the range of the macrogroup include *Hesperostipa comata* and *Pascopyrum smithii*. Northern examples are typically dominated by *Festuca* spp., especially *Festuca hallii*, in combination with *Bouteloua gracilis, Hesperostipa curtiseta, Koeleria macrantha, Pascopyrum smithii, Poa pratensis*, and *Symphoricarpos occidentalis*. Southern examples are more likely to be dominated by species such as *Aristida purpurea, Bothriochloa laguroides ssp. torreyana, Bouteloua curtipendula, Schizachyrium scoparium*, and *Sporobolus cryptandrus*. The most mesic sites can have abundant tallgrasses, especially *Andropogon gerardii, Panicum virgatum*, and *Sorghastrum nutans*. Other common associated species include *Bouteloua gracilis, Bouteloua dactyloides, Carex filifolia, Carex inops ssp. heliophila, Calamovilfa longifolia, Elymus lanceolatus, Festuca idahoensis, Hesperostipa curtiseta, Hesperostipa neomexicana, Koeleria macrantha, Muhlenbergia montana, Nassella leucotricha, Nassella viridula, Pseudoroegneria spicata, Sorghastrum nutans*, and *Sporobolus compositus*. Common forb species tend to be somewhat restricted but may include *Achillea millefolium, Ambrosia psilostachya, Amphiachyris dracunculoides, Artemisia ludoviciana, Cerastium arvense, Dalea purpurea, Echinacea angustifolia, Galium boreale, Hymenopappus scabiosaeus, Liatris punctata, Lygodesmia juncea, Pediomelum linearifolium*, and *Symphyotrichum falcatum*. Woody species can occur and include *Amelanchier alnifolia, Artemisia cana, Dasiphora fruticosa ssp. floribunda, Juniperus horizontalis, Prosopis glandulosa, Prunus virginiana, Rhus trilobata, Rosa arkansana*, and *Symphoricarpos occidentalis*. Isolated patches of *Quercus macrocarpa* also can occur. Some examples may range into shrub-steppe. Grazing and fire are important dynamic processes in this macrogroup and can significantly influence the distribution and dominance of species within it. Fire suppression and overgrazing within the region has enabled the invasion of both exotics and some shrub species such as *Juniperus virginiana* and *Prosopis glandulosa*. These factors have also allowed for the establishment of *Pinus ponderosa* in the northwestern parts of the range. Conversion to agriculture likewise has decreased the range of this macrogroup. This type is found in regions centered between the shortgrass prairies in the western Great Plains and the tallgrass prairies in the eastern Great Plains. It occurs on both glaciated and non-glaciated substrates on a wide variety of landforms. The distribution, species richness and productivity of plant species is controlled by environmental conditions, in particular soil moisture and topography. Soils range from fine-textured loams to sandy or gravelly soils. Northern examples of this macrogroup contain significant areas of solonetzic soils, characterized by a subsoil hardpan layer with a high proportion of sodium and may also be clay, silty clay, or loam. The relative dominance of the various grass and forb species within different associations in the macrogroup also can strongly depend on the degree of natural or human disturbance. Because of its proximity to other prairie types, this macrogroup contains elements from both shortgrass and tallgrass prairies, which combine to form the mixedgrass prairie throughout its range.

\*Diagnostic Characteristics: This macrogroup is dominated by medium-tall graminoids and, in addition to a suite of diagnostic mixedgrass species, also contains elements from both the shortgrass prairies to the west and the tallgrass prairies to the east. The most common species present across the range of the group include *Hesperostipa comata* and *Pascopyrum smithii*. Drier sites may be codominated by shortgrass species such as *Bouteloua gracilis* and *Koeleria macrantha*. Northern sites in the Dakotas, Montana, and Canada are typically dominated by *Festuca* spp., especially *Festuca hallii*, and *Hesperostipa curtiseta*.

\*Classification Comments: A significant portion of the range of this macrogroup occurs in Canada. The rough fescue (*Festuca hallii*) in the north, where it extends into the aspen parkland, may be distinct enough to recognize as a separate macrogroup, but diagnostic species beyond rough fescue are needed (perhaps *Hesperostipa curtiseta*). More information about occurrences in Canada will help refine the definition of the northern range of this macrogroup. Characteristic codominants of fescue grassland include *Bouteloua gracilis, Hesperostipa curtiseta, Pascopyrum smithii, Poa pratensis, Symphoricarpos occidentalis*, as well as *Koeleria macrantha*.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M151 | Great Plains Forest & Woodland |  |
| M054 | Central Lowlands Tallgrass Prairie |  |
| M052 | Great Plains Sand Grassland & Shrubland |  |
| M053 | Western Great Plains Shortgrass Prairie |  |
| M498 | Great Plains Ruderal Grassland & Shrubland |  |
| M115 | Great Plains Badlands Vegetation |  |

Similar NVC Types General Comments [optional]: This macrogroup (M051) occurs between ~Western Great Plains Shortgrass Prairie Macrogroup (M053)$$ to the west and ~Central Lowlands Tallgrass Prairie Macrogroup (M054)$$ to the east and typically contains elements of each.

VEGETATION

Physiognomy and Structure Summary: This macrogroup is characterized by a dense to sparse mixture of mixedgrass species, along with tall and short grasses interspersed with forbs and short shrubs. Some examples may contain considerable leaf litter, bare soil and rock.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The most common graminoid species occurring across the range of the macrogroup include of *Hesperostipa comata (= Stipa comata)* and *Pascopyrum smithii*. Other common species include *Bouteloua curtipendula, Bouteloua gracilis, Bothriochloa laguroides ssp. torreyana, Bouteloua dactyloides, Carex filifolia, Carex inops ssp. heliophila, Elymus lanceolatus, Pseudoroegneria spicata, Schizachyrium scoparium, Sorghastrum nutans, Sporobolus compositus, Sporobolus cryptandrus*, and *Sporobolus heterolepis*. Northern examples in Montana, the Dakotas, and Canada (the fescue grasslands) are typically dominated by *Festuca* spp. with the most common species being *Festuca hallii (= Festuca altaica ssp. hallii)*, typically in combination with *Bouteloua gracilis, Hesperostipa curtiseta (= Stipa curtiseta), Koeleria macrantha, Pascopyrum smithii, Poa pratensis*, and *Symphoricarpos occidentalis* (Kupsch et al. 2012). Southern examples are more likely to be dominated by species such as *Aristida purpurea, Bothriochloa laguroides ssp. torreyana, Bouteloua curtipendula, Schizachyrium scoparium*, and *Sporobolus cryptandrus*. Common forb species include *Ambrosia psilostachya, Amphiachyris dracunculoides, Artemisia frigida, Dalea purpurea, Echinacea angustifolia, Lygodesmia juncea, Opuntia polyacantha*, and *Sphaeralcea coccinea*. Woody species can occur in many examples. Some common species include *Amelanchier alnifolia, Artemisia cana, Dasiphora fruticosa ssp. floribunda, Juniperus horizontalis, Prosopis glandulosa, Prunus virginiana, Rhus trilobata, Rosa arkansana*, and *Symphoricarpos occidentalis*. *Elaeagnus commutata* shrublands are common in the northern fescue grasslands. Isolated patches of *Quercus macrocarpa* also can occur. Some examples may range into shrub-steppe. Species composition and abundance can shift dramatically with overgrazing.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Fire, grazing, and drought are the primary processes occurring within the macrogroup. The diversity in this mixedgrass prairie likely reflects both the short- and long-term responses of the vegetation to these often concurrent disturbance regimes (Collins and Barber 1985). Fire is not as common as in more fertile, well-watered tallgrass prairies further east but is still important. Fire-return intervals in the central Great Plains have been estimated at 15-25 years (LANDFIRE 2007a) but fires burn patchily across the landscape, consuming vegetation in some areas and missing others. This combined with the differential responses of species to burning results in greater diversity across the landscape (Wright 1974). Grazing by native ungulates, primarily bison (*Bos bison*) and small mammals, principally prairie dogs (*Cynomys* spp.) added a further degree of patchy disturbance to the mixedgrass prairie (Whicker and Detling 1988, Weltzin et al. 1997). Long-term precipitation variance affects diversity of the mixedgrass prairie, creating conditions more favorable to shortgrass species during droughts while allowing mixedgrass species to spread during wetter years (Albertson and Tomanek 1965).

ENVIRONMENT

Environmental Description: This macrogroup occurs on a wide variety of landforms and soils. Climate and growing season length for the region in which it occurs are intermediate to the shortgrass regions to the west and southwest and the tallgrass regions to the east. Soils range from loams, clay loams, silty clays, and clays to more coarse-textured sandy or gravelly soils. The northern fescue grasslands in Alberta are dominated by dark brown chernozemic soils on a level to undulating plain. Parent materials are dominated by glacial till. The climate is cold, continental (mean daily temperature of 3.8°C, total precipitation 38 cm) with few chinooks, compared to the somewhat warmer and moist climate of the mixedgrass prairies in southern Alberta (mean daily temperature 4.5-5.0°C and total precipitation 34-42 cm) (Kupsch et al. 2012). Some examples may include an impermeable or slowly permeable subsoil claypan layer. Other northern soils may be solonetzic and characterized by a subsoil hardpan layer with an excess of sodium (Adams et al. 2013).

DISTRIBUTION

\*Geographic Range: This macrogroup is found in the central Great Plains, ranging from Manitoba, Saskatchewan and Alberta, Canada, south into northern Texas and northeastern New Mexico. Fescue grasslands are found in Alberta, Saskatchewan, Montana, and possibly North Dakota.

Nations: CA, US

States/Provinces: AB, CO, KS, MB, MT, ND, NE, NM, OK, SD, SK, TX, WY

USFS Ecoregions (2007) [optional]: 223A:??, 251A:CC, 251B:CC, 251E:CP, 251F:CC, 251H:CC, 255A:??, 315A:CC, 315B:CC, 315F:CC, 315H:CC, 331B:CC, 331C:CC, 331D:CC, 331E:CC, 331F:CC, 331G:CC, 331H:CC, 331I:CC, 331J:CC, 331K:CC, 331L:CC, 331M:CC, 331N:CC, 332A:CP, 332B:CC, 332C:CC, 332D:CC, 332E:CC, 332F:CC, 342A:CP, 342F:CC, 342G:CC, M313A:CP, M313B:CC, M331A:CC, M331B:CC, M331D:CP, M331F:CC, M331G:CC, M331I:CC, M331J:C?, M332B:CC, M332D:CC, M332E:CC, M332F:CP, M333B:CC, M333C:CC, M334A:CC, M341A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G133 | Central Great Plains Mixedgrass Prairie |
| G331 | Northern Great Plains Dry Mixedgrass Prairie |
| G141 | Northern Great Plains Mesic Mixedgrass Prairie |
| G332 | Northern Great Plains Rough Fescue Prairie |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Blue Grama - Western Wheatgrass (704) | Shiflet 1994 |  |
| > | Bluestem - Grama (709) | Shiflet 1994 |  |
| < | Bluestem - Grama Prairie (604) | Shiflet 1994 |  |
| < | Bluestem Prairie (601) | Shiflet 1994 |  |
| < | Bluestem Prairie (710) | Shiflet 1994 |  |
| < | Eastern Redcedar: 46 | Eyre 1980 | Only on really degraded sites. |
| >< | Fescue Grassland (613) | Shiflet 1994 |  |
| < | Wheatgrass (610) | Shiflet 1994 |  |
| >< | Wheatgrass - Bluestem - Needlegrass (606) | Shiflet 1994 |  |
| < | Wheatgrass - Grama (609) | Shiflet 1994 |  |
| < | Wheatgrass - Grama - Needlegrass (608) | Shiflet 1994 |  |
| < | Wheatgrass - Needlegrass (607) | Shiflet 1994 |  |
| >< | Wheatgrass - Saltgrass - Grama (615) | Shiflet 1994 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.E. Weaver and F.W. Albertson (1956); R.T. Coupland (1961)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S. Menard, K. Kindscher, L. Elliott, D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 20 Nov 2015

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2. Shrub & Herb Vegetation

2.B.2.Nb. Central North American Grassland & Shrubland

M053. Western Great Plains Shortgrass Prairie

Type Concept Sentence: This macrogroup is composed of the matrix short grasslands in the western Great Plains, from southeastern Wyoming to the Texas panhandle, and is characterized the dominance of short grasses *Bouteloua gracilis* and *Bouteloua dactyloides*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nb. Central North American Grassland & Shrubland (D023)

Elcode: M053

\*Scientific Name: *Bouteloua gracilis - Bouteloua dactyloides* Shortgrass Prairie Macrogroup

\*Common (Translated Scientific) Name: Blue Grama - Buffalograss Shortgrass Prairie Macrogroup

\*Colloquial Name: Western Great Plains Shortgrass Prairie

\*Type Concept: This macrogroup forms the matrix grassland in the western half of the Western Great Plains Division east of the Rocky Mountains and ranges from southeastern Wyoming and the western Nebraska panhandle south into the panhandles of Oklahoma and Texas and eastern New Mexico. The vegetation is primarily dominated by *Bouteloua gracilis* and *Bouteloua dactyloides* throughout its range, with various associated graminoid species changing depending on latitude, precipitation, soils, and management. In the southern portion *Prosopis glandulosa* may form a sparse to moderately dense short-tree or shrub canopy in uplands over shortgrass understory. Associated graminoids may include *Achnatherum hymenoides, Aristida purpurea, Bouteloua curtipendula, Bouteloua hirsuta, Carex filifolia, Carex inops ssp. heliophila, Eragrostis intermedia, Hesperostipa comata, Hesperostipa neomexicana, Koeleria macrantha, Muhlenbergia torreyi, Pascopyrum smithii, Pleuraphis jamesii, Sporobolus airoides*, and *Sporobolus cryptandrus*. Although mid-height grass species may be present, especially on more mesic land positions and soils, they are secondary in importance to the sod-forming short grasses. Sandy soils have higher cover of *Hesperostipa comata, Sporobolus cryptandrus*, and *Yucca glauca*. Scattered shrub and dwarf-shrub species may also be present. *Gutierrezia sarothrae* is often present to codominant especially in disturbed areas. Cacti species such as cholla (*Cylindropuntia imbricata*) and prickly-pears (*Opuntia polyacantha* and *Opuntia phaeacantha*) can be abundant on some sites. Stands occur on primarily flat to rolling uplands. Soils typically are loamy and ustic but range from sandy to clayey. Climate is temperate, semi-arid continental with mean annual precipitation generally about 300 mm, ranging up to 500 mm in the warmer south extent where precipitation is less effective. Annual precipitation has a bimodal distribution, occurring mostly before the growing season in winter and early spring and then during summer as monsoon thunderstorms. Summer precipitation events are mostly <10 cm but occasionally larger. High variation in amount and timing of annual precipitation impacts the relative cover of cool- and warm-season herbaceous species.

Climate, fire and grazing constitute the primary processes impacting this macrogroup. In contrast to other prairie macrogroups, fire is less important, especially in the western range because the dry to xeric climate conditions produce less vegetation/fuel load. However, historically, fires that did occur were often very expansive, especially after a series of years with above-average precipitation when litter/fine fuels can build up. Currently, fire suppression and more extensive grazing in the region have likely decreased the fire frequency, and it is unlikely that these processes could occur at a natural scale. A large part of the range for this macrogroup (especially in the east and near rivers) has been converted to agriculture. Areas of the central and western range have been impacted by the unsuccessful attempts to develop dryland cultivation during the Dust Bowl of the 1930s. Historically, mesquite shrublands probably occurred as a natural component on more fertile soils and along drainages, but they have expanded their range into prairie uplands in recent decades.

\*Diagnostic Characteristics: This macrogroup is characterized by a short, often discontinuous graminoid layer typically dominated or codominated by *Bouteloua gracilis* and *Bouteloua dactyloides*. Many other graminoids of varying height may be associated; however, medium-tall and tall grasses will not dominate. *Gutierrezia sarothrae* is often present to codominant especially in disturbed areas. Woody plants may be present but typically have <10% cover. Cacti species such as *Opuntia polyacantha* and *Cylindropuntia imbricata* can be abundant on some sites.

\*Classification Comments: The dominant grass in this macrogroup, *Bouteloua gracilis*, is tolerant of heavy grazing and drought, which favor it over other taller and less xeric grass species (Weaver and Albertson 1956). Some ecologists consider stands in this macrogroup to be disclimax grassland of mixedgrass prairie resulting from over-grazing by livestock (Weaver and Albertson 1956). Because this macrogroup classifies existing vegetation, it potentially could include both early-seral "disclimax" and late-seral "climax" stands. But in the northwest mixedgrass prairie region, where extended, heavy grazing may cause a shortgrass disclimax, it is not clear that the grassland per se is more similar to the shortgrass prairie described here or to a degraded form of mixedgrass prairie. So for now we extend this type from southeastern Wyoming into the Texas panhandle (as in Küchler 1985). In addition, in Montana and Alberta, in ~Great Plains Mixedgrass & Fescue Prairie Macrogroup (M051)$$, there is ~Northern Great Plains Dry Mixedgrass Prairie Group (G331)$$, which should be kept separate from this type. The Shortgrass Prairie grassland type in Sims et al. (1978) is closest conceptually to this macrogroup. Many others, such as Singh et al. (1983), Lauenroth and Milchunas (1992), Dick-Peddie (1993), Sims and Risser (2000), and Lauenroth and Burke (2008), recognize this macrogroup (limiting its northward distribution to southeastern Wyoming), though they may use climate or other environmental or geographic factors as well as typical shortgrass prairie composition. So, at least for now this macrogroup largely corresponds to the shortgrass steppe/prairie ecoregion and ~Western Great Plains Shortgrass Prairie (CES303.672)$$, an ecological system. It may also be that western Great Plains juniper - oak scrub belongs here (M. Schiebout pers. comm. 2014), but more information is needed.

Historically, mesquite shrublands probably occurred as a natural component on more fertile soils and along drainages, but where it has expanded its range into prairie uplands in recent decades, it is considered ruderal.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M051 | Great Plains Mixedgrass & Fescue Prairie | includes mixedgrass groups ~Central Great Plains Mixedgrass Prairie Group (G133)$$ and ~Northern Great Plains Mixedgrass Prairie Group (G141)$$ that occur adjacent and may be transitional, and depending on past management may be overgrazed to resemble vegetation in this macrogroup. |
| M052 | Great Plains Sand Grassland & Shrubland |  |
| M087 | Chihuahuan Semi-Desert Grassland | includes mixedgrass groups ~Chihuahuan Desert Foothill-Piedmont & Lower Montane Grassland Group (G490)$$ and ~Chihuahuan Semi-Desert Lowland Grassland Group (G489)$$ that occur adjacent and may be transitional. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is characterized by a short, often discontinuous herbaceous layer dominated by short perennial grasses. Woody vegetation is typically sparse or absent.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This macrogroup spans a wide range and thus there can be some differences in the relative dominance of some species from north to south and from east to west. It is primarily dominated by *Bouteloua gracilis* and *Bouteloua dactyloides (= Buchloe dactyloides)* throughout its range with various associated graminoid species depending on precipitation, soils and management. In the southern extent *Prosopis glandulosa* may form a sparse to moderately dense short-tree or shrub canopy in uplands over shortgrass understory. *Ziziphus obtusifolia* and *Atriplex canescens* can codominate in some stands, especially in heavily grazed areas (Scifres 1980, Shiflet 1994). Associated graminoids may include *Achnatherum hymenoides, Aristida purpurea, Bouteloua curtipendula, Bouteloua hirsuta, Bouteloua dactyloides, Carex filifolia, Eragrostis intermedia, Hesperostipa comata, Koeleria macrantha (= Koeleria cristata), Muhlenbergia torreyi, Pascopyrum smithii (= Agropyron smithii), Pleuraphis jamesii, Sporobolus airoides*, and *Sporobolus cryptandrus*. Although mid-height grass species may be present, especially on more mesic land positions and soils, they are secondary in importance to the sod-forming short grasses. Sandy soils have higher cover of *Hesperostipa comata, Sporobolus cryptandrus*, and *Yucca glauca*. Scattered shrub and dwarf-shrub species such as *Artemisia filifolia, Artemisia frigida, Artemisia tridentata, Atriplex canescens, Dalea formosa, Eriogonum effusum, Lycium pallidum, Mimosa borealis*, and *Rhus trilobata* may also be present. *Gutierrezia sarothrae* is often present to codominant, especially in disturbed areas. Cacti species such as *Cylindropuntia imbricata (= Opuntia imbricata), Opuntia polyacantha*, and *Opuntia phaeacantha* can be abundant on some sites (Sims et al. 1978). Codominant forbs include *Astragalus mollissimus, Erysimum asperum, Engelmannia peristenia (= Engelmannia pinnatifida), Gaura coccinea, Melampodium leucanthum, Machaeranthera tanacetifolia, Psoralidium tenuiflorum*, and *Thelesperma megapotamicum* (M. Schiebout pers. comm. 2014). High annual variation in amount and timing of precipitation impacts relative cover of herbaceous species with cover of cool-season grasses more abundant when winter and early-spring precipitation is above average. Floristic information was compiled from Weaver and Albertson (1956), Sims et al. (1978), Brown et al. (1980, 1998), Barbour and Billings (1988), Milchunas et al. (1989), Lauenroth and Milchunas (1992), Dick-Peddie (1993), Ricketts et al. (1999), Sims and Risser (2000) Schiebout et al. (2008), and Lauenroth and Burke (2008).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Large-scale processes such as climate, fire and grazing constitute the primary processes impacting this macrogroup. The short grasses that dominate are extremely drought- and grazing-tolerant (Lauenroth and Milchunas 1992, Lauenroth et al. 1994a). These species evolved with large herbivores and drought (Milchunas and Lauenroth 2008) and adapted to historical heavy grazing with their low stature making them relatively resistant to overgrazing (Lauenroth et al. 1994a). The return intervals for grazing varied, with areas distant from water sources likely grazed less heavily as those near water. However, the shortgrass steppe probably has the highest intensity of grazing, historically (Lauenroth et al. 1994a, Milchunas 2006). This macrogroup is drought-tolerant, however, extended drought (over 3-4 years) will reduce cover (Landfire 2007a). Many shortgrass species are drought-tolerant and have root systems that extend up near the soil surface where they can utilize low precipitation events (Salas and Lauenroth 1982). If blue grama is eliminated from an area by extended drought (3-4 years) or disturbance such as plowing, regeneration is slow because of very slow tillering rates (Samuel 1985), low and variable seed production (Coffin and Lauenroth 1992), minimal seed storage in soil (Coffin and Lauenroth 1989), and limited seedling germination and establishment due to particular temperature and extended soil moisture requirements for successful seedling establishment (Hyder et al. 1971, Briske and Wilson 1978, 1980). Patterns and scales of heterogeneity related to historic natural grazing and fire regimes within the macrogroup are not well understood, but are assumed to be important to biodiversity (Fuhlendorf et al. 2006).

In contrast to other prairie macrogroups, fire is less frequent, especially in the western extent where the often dry and xeric climate conditions decrease the fuel load and thus the relative fire frequency. However, historically, fires that did occur were often very extensive. Wright and Bailey (1982c) suggest that in semi-arid areas, big prairie fires usually occurred during drought years that followed one to three years of above-average precipitation, because of the abundant and continuous fuel. Consequently, these wildfires could travel far when the winds and air temperatures were high and relative humidity was low. There is debate as to the mean fire-return interval (MFRI) for this shortgrass macrogroup. However, there is no way to reconstruct a reliable historic fire-return interval because of the lack of long-lived trees, and trees that do exist are in relatively productive sites. All estimates of historic fire-return intervals must be based on those for surrounding vegetation types that do have means for reconstruction, and then extrapolated based on differences in primary production and herbivore removal of fuel loads. Therefore, there is no means to directly obtain the estimate, and the range is varied. It depends on many factors: portions will be drier, and portions will vary in frequency over time and there will be decadal variation. Anderson (2003) reports a broad mean fire-return interval (MFRI) of <35 years for shortgrass prairie. There is a wide variability of MFRI across this macrogroup, based on precipitation, fuel and ignition sources (Landfire 2007a). Because of the increasing precipitation gradient west to east in the shortgrass prairie, the shorter historic MFRI estimates (~5 years) are expected in the less xeric eastern extent.

Currently, fire suppression and more extensive grazing in the region have likely decreased the fire frequency even more, and it is unlikely that these processes could occur at a natural scale. A large part of the range for this macrogroup (especially in the east and near rivers) has been converted to agriculture. Areas of the central and western range have been impacted by the unsuccessful attempts to develop dryland cultivation during the Dust Bowl of the 1930s.

ENVIRONMENT

Environmental Description: This macrogroup forms the matrix grassland in the western half of the Western Great Plains Division and largely occurs in the rainshadow of the Rocky Mountains. Stands are located on primarily flat to rolling uplands. Soils typically are loamy and ustic and range from sandy to clayey (Scifres 1980, Shiflet 1994). This macrogroup is the driest of the Great Plains grasslands. In the southeastern-most expression of the grassland in Texas, it occurs on sites with soils providing relatively dry conditions such as Rough Breaks, Shallow Clay, Very Shallow, and Very Shallow Clay Ecological Sites (Elliott 2011).

*Climate:* The climate is temperate, semi-arid, and continental with mean annual precipitation generally about 300 mm, ranging up to 500 mm in the east. Annual precipitation has a bimodal distribution occurring mostly before the growing in winter and early spring and then during summer as monsoon thunderstorms (Sims et al. 1978). Summer precipitation events are mostly <10 cm with occasional larger events (Sala and Lauenroth 1982). High variation in amount and timing of annual precipitation impacts the relative cover of cool- and warm-season herbaceous species. Average daily temperature in July varies from 27°C in the southeast to 21°C in the northwest and along the foothills of the Rocky Mountains. Average daily temperature in January varies from 3°C in the south to -6°C in the northwest.

Historically, fires were often very expansive, especially after a series of years with above-average precipitation when litter/fine fuels can build up. Currently, fire suppression and more extensive grazing in the region have likely decreased the fire frequency even more, and it is unlikely that these processes could occur at a natural scale. A large part of the range for this macrogroup (especially in the east and near rivers) has been converted to agriculture. Areas of the central and western range have been impacted by the unsuccessful attempts to develop dryland cultivation during the Dust Bowl of the 1930s.

DISTRIBUTION

\*Geographic Range: This macrogroup forms the matrix grassland in the western half of the Western Great Plains Division east of the Rocky Mountains and ranges from the Nebraska panhandle and southeastern Wyoming south into the panhandles of Oklahoma and Texas and eastern New Mexico, although some smaller patch examples may reach as far north as southern Canada.

Nations: CA, MX?, US

States/Provinces: CO, KS, NE, NM, OK, TX, WY

USFS Ecoregions (2007) [optional]: 315A:CC, 315B:CC, 315F:CC, 321A:CC, 331B:CC, 331C:CC, 331F:CC, 331H:CC, 331I:CC, 332C:CC, 332E:CC, 332F:CC, M313B:CC, M331F:CC, M331I:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G144 | Great Plains Shortgrass Prairie |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | *Bouteloua-Buchloë* | Küchler 1964 | This potential natural vegetation type is approximately equivalent to the NVC macrogroup existing vegetation. |
| < | Black Grama - Alkali Sacaton (702) | Shiflet 1994 |  |
| < | Black Grama - Sideoats Grama (703) | Shiflet 1994 |  |
| < | Blue Grama - Buffalograss (611) | Shiflet 1994 |  |
| < | Blue Grama - Galleta (705) | Shiflet 1994 |  |
| < | Blue Grama - Sideoats Grama (706) | Shiflet 1994 |  |
| < | Blue Grama - Sideoats Grama - Black Grama (707) | Shiflet 1994 |  |
| < | Blue Grama - Western Wheatgrass (704) | Shiflet 1994 |  |
| < | Buffalo-grass Series - 142.13 | Brown et al. 1980 |  |
| < | Galleta -Alkali Sacaton (712) | Shiflet 1994 |  |
| = | Grama "Shortgrass" Series - 142.12 | Brown et al. 1998 |  |
| < | Grama "Shortgrass" Series - 142.12 | Brown et al. 1980 |  |
| = | Grama - Buffalo Grass Section (3113) | Bailey 1980 |  |
| < | Grama - Buffalograss (715) | Shiflet 1994 |  |
| < | Grama - Feathergrass (716) | Shiflet 1994 |  |
| >< | Grama - Needlegrass - Wheatgrass Section (3111) | Bailey 1980 | Includes western portion of this section. |
| > | Great Plains-Shortgrass Prairie Province (3110) | Bailey 1980 | Does not include Wheatgrass - Needlegrass Section (3112). |
| >< | Mixed "Shortgrass" Series - 142.13 | Brown et al. 1998 |  |
| < | Mixed "Shortgrass" Series - 142.14 | Brown et al. 1980 |  |
| > | Mixed Prairie | Weaver and Albertson 1956 |  |
| > | Northern Mixed Prairie | Singh et al. 1983 |  |
| < | Plains and Mesas Grasslands | Dick-Peddie 1993 |  |
| = | Shortgrass Prairie | Sims et al. 1978 |  |
| < | Shortgrass Steppe | Singh et al. 1983 |  |
| < | Shrub-Grass Disclimax Series - 142.15 | Brown et al. 1980 |  |
| > | Southern Mixed Prairie | Singh et al. 1983 |  |
| >< | Vine Mesquite - Alkali Sacaton (725) | Shiflet 1994 |  |
| >< | Wheatgrass - Saltgrass - Grama (615) | Shiflet 1994 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: P.L. Sims, J.S. Singh, and W.K. Lauenroth (1978)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and B. Hoagland

Acknowledgments [optional]:

Version Date: 10 Nov 2015

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2. Shrub & Herb Vegetation

2.B.2.Nb. Central North American Grassland & Shrubland

M052. Great Plains Sand Grassland & Shrubland

Type Concept Sentence: This Great Plains macrogroup is found from Texas to southern Canada on somewhat excessively to excessively well-drained, deep sandy to loamy sand soils and contains grasses and scattered to moderately dense shrubs well-adapted to these soil conditions. Wind erosion, grazing and fire can significantly impact this macrogroup.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nb. Central North American Grassland & Shrubland (D023)

Elcode: M052

\*Scientific Name: *Andropogon hallii - Calamovilfa longifolia - Artemisia filifolia* Great Plains Sand Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Sand Bluestem - Prairie Sandreed - Sand Sagebrush Great Plains Sand Grassland & Shrubland Macrogroup

\*Colloquial Name: Great Plains Sand Grassland & Shrubland

\*Type Concept: This Great Plains macrogroup is found from Texas to southern Alberta and Saskatchewan on somewhat excessively to excessively well-drained, deep sandy to loamy sand soils and contains species well-adapted to these soil conditions. Grass and shrub species composition in sand prairies is determined not only by soil texture and drainage, but by morphological (root architecture) and physiological (photosynthetic, water use efficiency) adaptations. Dominant grasses in this macrogroup exhibit many of these adaptations. *Andropogon hallii* and *Calamovilfa longifolia* are the most common species, but other grass and forb species, such as *Bouteloua* spp., *Calamovilfa gigantea, Carex inops ssp. heliophila, Hesperostipa comata, Panicum virgatum, Schizachyrium scoparium*, and *Sporobolus cryptandrus*, can be common. A sparse to moderately dense shrub layer is common. The most common shrub species is *Artemisia filifolia*. Other possible shrub species include *Artemisia cana ssp. cana, Betula occidentalis, Juniperus horizontalis, Prunus angustifolia, Rhus trilobata*, and *Yucca glauca*. *Quercus havardii* and *Prosopis glandulosa* may also be present and dominant in some stands in the southern range of this macrogroup. Northward in Alberta, *Hesperostipa comata* and *Calamovilfa longifolia* are common, often with *Sporobolus cryptandrus* and *Achnatherum hymenoides*. *Symphoricarpos occidentalis, Artemisia cana*, and *Rosa arkansana* are common shrubs. The largest expanse of relatively intact examples of this macrogroup (approximately 5 million ha) can be found in the Sandhills of north-central Nebraska and southwestern South Dakota. The climate is semi-arid to arid for much of the region where this macrogroup occurs. Soils are somewhat excessively to excessively well-drained, deep sands that are often associated with dune systems and ancient floodplains. These soils can be relatively undeveloped (Entisols) and are highly permeable. This macrogroup is particularly susceptible to wind erosion. Blowouts and sand draws are some of the unique wind-driven disturbances in the sand prairies. Grazing and fire constitute other important dynamics for this macrogroup. Overgrazing and fire suppression can impact the species distribution and dominance.

\*Diagnostic Characteristics: This macrogroup is found on excessively to excessively well-drained and deep sandy soils and contains sparse to moderately dense graminoids that favor more sandy soils. In the central part of the range, diagnostic species are *Andropogon hallii* and *Calamovilfa gigantea*. A sparse to moderately dense shrub layer dominated by *Artemisia filifolia* is also typical. Northward in Alberta, *Hesperostipa comata* and *Calamovilfa longifolia* are common, often with *Sporobolus cryptandrus* and *Achnatherum hymenoides*. *Symphoricarpos occidentalis, Artemisia cana*, and *Rosa arkansana* are common shrubs.

\*Classification Comments: Overgrazing can impact the species distribution and dominance of this macrogroup. This type is found throughout the range of shortgrass and mixedgrass prairies, but is distinct from those macrogroups. Sandy tallgrass sites share greater similarity with silty and loamy tallgrass sites.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M054 | Central Lowlands Tallgrass Prairie | contains similar tallgrass prairies, including the sand and gravel prairies to the north and east; examples are dominated by graminoid species such as *Andropogon gerardii, Panicum virgatum, Schizachyrium scoparium, Sorghastrum nutans* and *Sporobolus heterolepis*. |
| M498 | Great Plains Ruderal Grassland & Shrubland |  |
| M053 | Western Great Plains Shortgrass Prairie | may contain similar elements. |
| M051 | Great Plains Mixedgrass & Fescue Prairie | may contain similar elements. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is characterized by a dense to sparse layer of tall grasses interspersed with forbs and a sparse to moderately dense shrub layer.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This macrogroup is dominated by graminoids, in particular *Andropogon hallii* and *Calamovilfa longifolia*, with a sparse to moderately dense shrub layer. Other graminoids may be present, including *Bouteloua* spp., *Calamovilfa gigantea, Carex inops ssp. heliophila, Hesperostipa comata, Panicum virgatum, Schizachyrium scoparium*, and *Sporobolus cryptandrus*. Forb species vary across the range of this macrogroup but species of *Psoralidium* and *Pediomelum* can be common. *Penstemon haydenii* (Federally listed endangered) is endemic to this macrogroup and is of special conservation concern because of its probable decline from overgrazing and fire suppression. The shrub layer is dominated by *Artemisia filifolia*. Other possible shrub species include *Artemisia cana ssp. cana, Betula occidentalis, Juniperus horizontalis, Prunus angustifolia, Rhus trilobata*, and *Yucca glauca*. *Quercus havardii* and *Prosopis glandulosa* may also be present and dominant in some examples in the southern range of this macrogroup. Northward in Alberta, *Hesperostipa comata* and *Calamovilfa longifolia (= Calamagrostis longifolia)* are common, often with *Sporobolus cryptandrus* and *Achnatherum hymenoides*. *Artemisia cana, Amelanchier alnifolia, Prunus virginiana*, and *Rosa arkansana* are common shrubs.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The temporal and spatial distribution of soil moisture and topography highly influence the distribution, species richness, and productivity of this macrogroup. Spatially, drought and wind affect the macrogroup at different scales. Drought has regional effects on the species abundance and extent of the macrogroup. Wind, however, operates at more local scales and is an important disturbance. Soils on which this macrogroup occurs are particularly susceptible to wind erosion that produces features known as blowouts and sand draws, which can significantly impact vegetation composition and succession. Erosion and blowouts are initiated or maintained by vegetation removal as a result of overgrazing, fire and/or trampling. Fire suppression can also impact the species distribution and dominance within examples of this macrogroup.

ENVIRONMENT

Environmental Description: This macrogroup is found primarily in the semi-arid to arid areas of the Great Plains. Environmental conditions, primarily soil moisture and topography, control the distribution, species richness and productivity of plant species within this macrogroup. Sites occur on somewhat excessively to excessively well-drained, deep and relatively undeveloped sandy to loamy sand soils. It is often found on rolling topography and can occur on ridges, midslopes, and/or lowland areas. It is often associated with dune systems, especially in the Sandhills region of Nebraska and South Dakota, and/or ancient floodplains.

DISTRIBUTION

\*Geographic Range: This macrogroup is found throughout the central and western Great Plains region ranging from North Dakota, and possibly southern Canada, south to Texas and west into eastern Montana, Wyoming, Colorado, and New Mexico.

Nations: CA, US

States/Provinces: AB, CO, KS, MB?, MT, ND, NE, NM, OK, SD, SK, TX, WY

USFS Ecoregions (2007) [optional]: 251F:CC, 251H:CC, 255A:PP, 315A:CC, 315B:CC, 315F:CC, 321A:CC, 331B:CC, 331C:CC, 331D:CC, 331E:CC, 331F:CC, 331G:CC, 331H:CC, 331I:CC, 331K:CC, 331L:CC, 331M:CP, 331N:C?, 332C:CC, 332D:CC, 332E:CC, 332F:CC, M313B:PP

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G069 | Great Plains Sand Shrubland |
| G068 | Great Plains Sand Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Blue Grama - Sideoats Grama - Black Grama (707) | Shiflet 1994 |  |
| < | Bluestem - Prairie Sandreed (602) | Shiflet 1994 |  |
| > | Bluestem -Dropseed (708) | Shiflet 1994 |  |
| < | Grama -Bluestem (714) | Shiflet 1994 | Soil texture ranges from sand to clay loam? Inclusions? |
| < | Mesquite (southern type): 68 | Eyre 1980 |  |
| < | Mesquite (western type): 242 | Eyre 1980 |  |
| < | Mohrs (Shin) Oak: 67 | Eyre 1980 |  |
| < | Prairie Sandreed - Needlegrass (603) | Shiflet 1994 | This SRM type is found in the more northerly and northwest portions of this group (as far west as central Montana). |
| < | Sand Bluestem - Little Bluestem Dunes (720) | Shiflet 1994 |  |
| < | Sand Bluestem - Little Bluestem Plains (721) | Shiflet 1994 |  |
| = | Sand Sagebrush - Mixed Prairie (722) | Shiflet 1994 |  |
| < | Sand Shinnery Oak (730) | Shiflet 1994 |  |
| > | Sandsage Prairie (605) | Shiflet 1994 |  |
| >< | Wheatgrass - Grama - Needlegrass (608) | Shiflet 1994 | Sandy portions of this SRM type are included in this group. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.E. Weaver and T.J. Fitzpatrick (1934); W.L. Tolstead (1942)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S. Menard, K. Kindscher, B. Hoagland and D. Diamond

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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Thorpe, J. 2007c. Saskatchewan Rangeland Ecosystems Publication 5: Communities on the Sandy and Sandy Loam Ecosites. Saskatchewan Prairie Conservation Action Plan. Saskatchewan Research Council. Agriculture and Agri-Food Canada.

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2. Shrub & Herb Vegetation

2.B.2.Nb. Central North American Grassland & Shrubland

M158. Great Plains Comanchian Scrub & Open Vegetation

Type Concept Sentence: This scrub woodland and shrubland vegetation is found in the High, Rolling, and Red Bed plains of Texas and Oklahoma ranging south into parts of the Edwards Plateau and marginally in the Chihuahuan Desert regions of Texas and possibly adjacent Mexico, as well as the Southwestern Tablelands. Occurrences on dry, rocky sites typically include evergreen junipers and oaks such as *Juniperus ashei, Juniperus monosperma, Juniperus pinchotii, Quercus fusiformis, Quercus havardii, Quercus mohriana*, and *Quercus sinuata*, as well as *Prosopis glandulosa var. glandulosa, Buddleja racemosa, Dalea formosa*, and *Mimosa borealis* in some examples.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nb. Central North American Grassland & Shrubland (D023)

Elcode: M158

\*Scientific Name: *Juniperus ashei - Juniperus pinchotii - Quercus mohriana* Scrub & Open Vegetation Macrogroup

\*Common (Translated Scientific) Name: Ashe's Juniper - Pinchot's Juniper - Mohr Oak Scrub & Open Vegetation Macrogroup

\*Colloquial Name: Great Plains Comanchian Scrub & Open Vegetation

\*Type Concept: This scrub woodland vegetation is found in the High, Rolling, and Red Bed plains of Texas and Oklahoma ranging south into parts of the Edwards Plateau and Chihuahuan Desert regions of Texas, as well as the Southwestern Tablelands. Occurrences on dry, rocky sites typically include evergreen junipers and oaks such as *Juniperus ashei, Juniperus monosperma, Juniperus pinchotii, Quercus fusiformis, Quercus havardii, Quercus mohriana*, and *Quercus sinuata*, as well as *Prosopis glandulosa var. glandulosa* in some examples. Other woody species include *Buddleja racemosa, Cercocarpus montanus, Dalea formosa, Gutierrezia sarothrae, Mimosa borealis, Rhus lanceolata*, and *Rhus trilobata*. On deeper alluvial soils, *Prosopis glandulosa* may dominate, with species such as *Mahonia trifoliolata, Sideroxylon lanuginosum*, and *Ziziphus obtusifolia* also commonly encountered. Characteristic graminoids include *Aristida purpurea, Bouteloua curtipendula, Bouteloua gracilis, Bouteloua hirsuta, Bouteloua dactyloides, Pleuraphis mutica*, and *Schizachyrium scoparium*. Forbs, including species such as *Artemisia ludoviciana, Calylophus* sp., *Chaetopappa ericoides, Croton monanthogynus, Indigofera miniata, Krameria lanceolata, Melampodium leucanthum, Rhynchosia senna*, and *Ruellia nudiflora*, may also be present. The canopy is less than 6 m in height, and may be open with a grassy or rocky understory, or may form dense low patches or mottes interspersed with grasslands and rock outcrops. Bare ground is often conspicuous, and herbaceous cover, where present, is usually dominated by mid to short grasses and forbs. This vegetation occupies dry, rocky sites on mesas and escarpment breaks over a variety of geologic strata, including sandstones, shales, limestone and basalt. Alternatively, *Prosopis glandulosa*-dominated occurrences may occupy deeper, alluvial soils, often along drainages or topographic lows. Soils are variable in depth, and this vegetation can occur where there is little soil development.

\*Diagnostic Characteristics: These are *Quercus* and *Juniperus* scrub woodlands and shrublands, as well as *Prosopis glandulosa var. glandulosa* woodlands in the southwestern Great Plains and adjacent areas. This does not include vegetation characterized by *Prosopis glandulosa var. glandulosa* occurring in southern Texas.

\*Classification Comments: ~Comanchian Oak - Juniper Scrub Group (G191)$$ represents oak and juniper scrub woodlands and shrublands in the southwestern Great Plains and adjacent areas. It overlaps some with ~Madrean Pinyon - Juniper Woodland Group (G200)$$ in ~Madrean Lowland Evergreen Woodland Macrogroup (M010)$$ and ~Balconian Dry Forest & Woodland Group (G126)$$ in ~Balconian Forest & Woodland Macrogroup (M015)$$. These relationships should be examined. Due to the reproductive nature of some of the dominant species, it often exhibits patch dominance by a single species. Classification of this group as well as ~Comanchian Mesquite - Mixed Scrub Group (G192)$$ is further complicated because they may be difficult to distinguish from compositionally and structurally similar ruderal vegetation. G192 as described does not include vegetation characterized by *Prosopis glandulosa var. glandulosa* occurring in southern Texas.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]: ~Comanchian Oak - Juniper Scrub Group (G191)$$ has some overlap with ~Madrean Pinyon - Juniper Woodland Group (G200)$$ in ~Madrean Lowland Evergreen Woodland Macrogroup (M010)$$ and ~Balconian Dry Forest & Woodland Group (G126)$$ in ~Balconian Forest & Woodland Macrogroup (M015)$$. These relationships should be examined.

VEGETATION

Physiognomy and Structure Summary: Physiognomic expression varies from open, short, stunted woodlands, less than 6 m in height, to low dense shrublands. Many stands are dominated by evergreen oaks and junipers, but deciduous shrubs are also common. Some examples are dominated by *Prosopis glandulosa var. glandulosa*, in which the small size of the leaflets allows light to reach the ground even through more closed canopies.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Examples are dominated by evergreen junipers and oaks such as *Juniperus ashei, Juniperus monosperma, Juniperus pinchotii, Juniperus scopulorum, Quercus fusiformis, Quercus havardii, Quercus mohriana*, and *Quercus sinuata*, as well as *Prosopis glandulosa var. glandulosa* in some examples. Other woody species include *Acacia greggii, Aloysia gratissima, Buddleja racemosa, Cercocarpus montanus, Dalea formosa, Gutierrezia sarothrae, Mahonia trifoliolata, Mimosa borealis, Prosopis glandulosa, Rhus lanceolata, Rhus trilobata, Sapindus saponaria var. drummondii*, and *Ungnadia speciosa*. In addition, *Yucca glauca* and *Opuntia* spp. may be present. On deeper alluvial soils, *Prosopis glandulosa* may dominate, with species such as *Mahonia trifoliolata, Sideroxylon lanuginosum*, and *Ziziphus obtusifolia* also commonly encountered. Field layer cover is variable but often sparse. Characteristic graminoids, when present, include *Aristida purpurea, Bouteloua curtipendula, Bouteloua gracilis, Bouteloua hirsuta, Bouteloua dactyloides (= Buchloe dactyloides), Nassella leucotricha, Pleuraphis mutica, Schizachyrium scoparium*, and *Sporobolus vaginiflorus*. Forbs, including species such as *Artemisia ludoviciana, Calylophus* sp., *Chaetopappa ericoides, Croton monanthogynus, Indigofera miniata, Krameria lanceolata, Melampodium leucanthum, Mimosa* spp., *Rhynchosia senna*, and *Ruellia nudiflora*, may also be present. Additional forbs characteristic of open vegetation of rock outcrops are *Lesquerella gordonii, Lesquerella ovalifolia, Sedum nuttallianum*, and *Sedum pulchellum*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: Examples of ~Comanchian Oak - Juniper Scrub Group (G191)$$ occupy dry, rocky sites on mesas and escarpment breaks over a variety of geologic strata, including sandstones, shales, limestone and basalt. Soils are variable and this vegetation can occur where there is little soil development. ~Comanchian Mesquite - Mixed Scrub Group (G192)$$ occurs on a variety of soil types but is best developed on bottomland soils (L. Elliott pers. comm., D. Diamond. pers. comm.).

DISTRIBUTION

\*Geographic Range: This scrub woodland vegetation is found in the High, Rolling, and Red Bed plains of Texas and Oklahoma ranging south into parts of the Edwards Plateau and marginally in the Chihuahuan Desert regions of Texas and possibly adjacent Mexico, as well as the Southwestern Tablelands.

Nations: MX?, US

States/Provinces: MXCH?, MXCO?, NM?, OK, TX

USFS Ecoregions (2007) [optional]: 315B:CC, 315C:CC, 315D:CC, 315F:CC, 315G:CC, 321A:CP, 321B:CC, 332F:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G598 | Comanchian Barrens & Glade |
| G191 | Comanchian Oak - Juniper Scrub |
| G192 | Comanchian Mesquite - Mixed Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | *Prosopis glandulosa* Shrubland Alliance | Hoagland 2000 |  |
| >< | Ashe Juniper - Redberry (Pinchot) Juniper: 66 | Eyre 1980 |  |
| >< | Live Oak - Mesquite Savanna | Tharp 1939 |  |
| >< | Mesquite - Grassland | Tharp 1939 |  |
| >< | Mesquite Grassland | Hoagland 2008 |  |
| >< | Mesquite Plains | Blair and Hubbell 1938 |  |
| >< | Mohrs (Shin) Oak: 67 | Eyre 1980 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J. Teague, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne and J. Teague

Acknowledgments [optional]:

Version Date: 07 May 2015

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2. Shrub & Herb Vegetation

2.B.2.Nc. Eastern North American Grassland & Shrubland

D024. Eastern North American Grassland & Shrubland

Type Concept Sentence: This division consists of open grasslands and shrublands in the northern and central regions of eastern Canada and the United States. Vegetation occurs on a variety of soil types and depth, with acidic to basic pH, that range in depth from deep loams to exposed rock. Vegetation types are colloquially known as alvars, balds, barrens, flatrocks, and glades, and often contain a prairie-like flora, but with distinctive eastern elements.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.2.Nc. Temperate Grassland & Shrubland (F012)

Elcode: D024

\*Scientific Name: *Schizachyrium scoparium - Danthonia spicata - Saxifraga michauxii* Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Little Bluestem - Poverty Oatgrass - Michaux's Saxifrage Grassland & Shrubland Division

\*Colloquial Name: Eastern North American Grassland & Shrubland

\*Type Concept: This division encompasses a variety of grass- and shrub-dominated vegetation types in the northern and central regions of eastern Canada and the United States, often on somewhat droughty or fire-dependent sites as compared to the surrounding forest and woodland matrix. Within a given area, both physiognomic types can be interspersed, or solely dominated by one or the other. In open tall prairie vegetation, such as in the barrens of Kentucky, *Andropogon gerardii, Andropogon ternarius, Panicum anceps, Panicum* spp., *Schizachyrium scoparium, Sorghastrum nutans*, and *Sporobolus* spp. are predominant. Common forb species include *Helianthus mollis, Helianthus occidentalis, Helianthus silphioides, Silphium terebinthinaceum*, and *Silphium trifoliatum*. Shrublands are composed of *Cercis canadensis, Forestiera ligustrina, Hypericum* spp., *Juniperus virginiana var. virginiana*, and *Rhus aromatica*. The species composition and stature of shrublands exhibit a great degree of variability. The woody species composition of some communities consists predominantly of ericaceous shrubs (*Arctostaphylos uva-ursi, Corema conradii, Gaultheria procumbens, Gaylussacia baccata, Kalmia angustifolia, Leiophyllum buxifolium, Pyxidanthera barbulata, Vaccinium angustifolium, Vaccinium myrtilloides, Vaccinium pallidum*) with scrub or stunted oak species (*Quercus ilicifolia, Quercus prinoides*, or *Quercus rubra*). In the case of Appalachian balds, composition varies with elevation, with communities of *Danthonia spicata, Dichanthelium* spp., and *Pinus virginiana, Quercus montana, Quercus stellata, Quercus velutina*, and *Schizachyrium scoparium*, at lower elevation yielding to *Carex pensylvanica, Danthonia compressa, Rhododendron catawbiense*, and *Sibbaldiopsis tridentata* at higher elevations. Alvar vegetation contains a mix of eastern prairie peninsula tallgrass prairie elements and eastern subboreal elements. The division occurs within two climate types (sensu Trewartha): Temperate Continental and Subtropical humid. The substrates are granite or rhyolite, limestone, metamorphic, sandstone, or serpentine. As a result, pH ranges from very acidic to basic. Soils range in depth from very deep to shallow or absent. Texture also is variable, from fine loamy to coarse soils. Vegetation on shallow soils is subject to extremely xeric conditions in the summer months, whereas those in regions with cold winters and moist soils experience frost-heaving. Species composition and dynamics in this division are influenced by fire frequency, land-use history, and herbivory, whether browsing by deer and grazing by cattle. Distinct from these natural conditions are ruderal grasslands and shrublands that typically occur on sites that have been cleared and plowed (for farming or development) and then abandoned, and are now dominated by weedy or generalist native and exotic forbs, grasses, ferns, and shrubs.

\*Diagnostic Characteristics: A diverse number of soil and substrate types are attribute to this division, making it difficult to find a diagnostic category related to abiotic conditions. Vegetation structure ranges from densely growing eastern tall prairie species, similar to the tallgrass prairie region in the prairie peninsula, to sparsely vegetated rock outcrops. Some taxa shared among macrogroups include *Danthonia* spp., *Juniperus horizontalis, Juniperus virginiana, Quercus montana, Quercus stellata, Schizachyrium scoparium*, and *Sporobolus* spp.

\*Classification Comments: Although some vegetation types within this division are well document (i.e., alvar), the need for additional analysis to resolve issues of vegetation composition and substrate relationships, as in the case of serpentine, do exist. There is a great variety in abiotic substrates, and a corresponding heterogeneity in vegetation. That said, a number of wide-ranging dominants are found in many of the stands, including *Juniperus virginiana, Danthonia sericea, Danthonia spicata*, and *Schizachyrium scoparium*.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D023 | Central North American Grassland & Shrubland | contains many of the same dominant grasses as are found in D024, particularly for ~Central Lowlands-West Gulf Coastal Tallgrass Prairie Macrogroup (M054)$$. |
| D025 | North American Boreal Grassland & Shrubland |  |
| D026 | Eastern North American Coastal Scrub & Herb Vegetation |  |
| D323 | Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland |  |
| D042 | Eastern North American Alpine Tundra |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This division consists of diverse physiognomic types, ranging from patchy vegetation (vascular and/or nonvascular) on rock outcrops, open grasslands, to sparsely treed vegetation, with a combination of grasses and shrubs in the understory, and dense shrublands, often predominated by ericaceous species. Vegetation associated with rock outcrops experience xeric conditions, often producing stunted growth form in woody plants.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: There is considerable variation in floristic composition, a product of regional and latitudinal environmental gradients, variation in soil type and depth and elevation. Key grass species include *Andropogon gerardii, Andropogon ternarius, Andropogon virginicus, Chasmanthium laxum, Danthonia sericea, Danthonia spicata, Deschampsia cespitosa, Deschampsia flexuosa, Dichanthelium acuminatum, Dichanthelium aciculare, Dichanthelium dichotomum, Dichanthelium linearifolium, Dichanthelium scoparium, Dichanthelium sphaerocarpon, Elymus hystrix, Panicum anceps, Panicum rigidulum, Panicum verrucosum, Panicum virgatum, Poa compressa, Schizachyrium scoparium, Sorghastrum nutans, Sporobolus clandestinus, Sporobolus heterolepis, Sporobolus neglectus, Sporobolus vaginiflorus*, and *Tripsacum dactyloides*.

Herbaceous species include *Aletris farinosa, Asclepias syriaca, Baptisia australis, Coreopsis major, Coreopsis tripteris, Doellingeria umbellata, Eupatorium perfoliatum, Eupatorium pilosum, Eupatorium rotundifolium, Eurybia hemispherica, Euthamia graminifolia, Eutrochium fistulosum, Fragaria virginiana, Helianthus angustifolius, Helianthus hirsutus, Helianthus mollis, Helianthus occidentalis, Helianthus silphioides, Lobelia puberula, Minuartia* spp., *Oenothera biennis, Packera tomentosa, Pityopsis graminifolia, Pteridium aquilinum, Potentilla simplex, Rudbeckia hirta, Sedum nuttallianum, Silphium laciniatum, Silphium terebinthinaceum, Silphium trifoliatum, Solidago altissima, Solidago canadensis, Solidago gigantea, Solidago nemoralis, Solidago rugosa, Symphyotrichum dumosum, Symphyotrichum lateriflorum, Symphyotrichum novae-angliae*, and *Symphyotrichum patens*. *Croton michauxii var. ellipticus (= Croton willdenowii), Portulaca pilosa, Sedum nuttallianum*, and *Selaginella rupestris* are present in communities on shallow soils and rock outcrops.

Woody species may consist of true shrubs or trees in a "dwarfed" or stunted condition and include *Abies balsamea, Amelanchier* spp., *Arctostaphylos uva-ursi, Cercis canadensis, Cornus racemosa, Cornus sericea, Crataegus* spp., *Fraxinus americana, Gaylussacia baccata, Juniperus horizontalis, Juniperus virginiana, Kalmia angustifolia, Kalmia latifolia, Larix laricina, Picea glauca, Pinus rigida, Pinus strobus, Prunus virginiana, Prunus americana, Quercus alba, Quercus montana (= Quercus prinus), Quercus stellata, Quercus marilandica, Rhus aromatica, Rhus glabra, Rhus typhina, Rubus* spp., *Thuja occidentalis, Ulmus alata, Vaccinium angustifolium, Vaccinium arboreum, Vaccinium corymbosum, Vaccinium myrtilloides, Vaccinium pallidum, Viburnum lentago*, and *Viburnum recognitum, Viburnum rufidulum*.

Nonvascular plant species, such as the moss genera *Dicranum* and *Polytrichum*, and the lichen genus *Cladonia*, are common in shallow soil and rock outcrop sites.

Eastern ruderal grasslands and shrublands encompass sites in the northern and central regions of the eastern United States that have been cleared and plowed (for farming or development) and then abandoned, and are now dominated by weedy or generalist native and exotic forbs, grasses, ferns, and shrubs. Open old-field meadows have characteristic forbs that include *Asclepias syriaca, Centaurea stoebe ssp. micranthos (= Centaurea maculosa), Cerastium arvense, Daucus carota, Euthamia graminifolia, Fragaria virginiana, Oenothera biennis, Picris hieracioides, Potentilla simplex, Rudbeckia hirta, Solidago altissima, Solidago canadensis, Solidago juncea, Solidago nemoralis, Solidago rugosa, Symphyotrichum lateriflorum (= Aster lateriflorus)*, and *Symphyotrichum novae-angliae (= Aster novae-angliae)*. Common grasses include *Anthoxanthum odoratum, Bromus inermis, Dactylis glomerata, Elymus repens (= Agropyron repens), Lolium* spp., *Phleum pratense, Poa compressa*, and *Poa pratensis*. Shrubs may be present, but collectively they have less than 25% cover. The mesic old-field shrublands are typically dominated by *Amelanchier* spp., *Cornus racemosa (= Swida racemosa), Cornus sericea (= Swida sericea), Crataegus* spp., *Juniperus virginiana, Prunus americana, Prunus virginiana, Rhus glabra, Rhus typhina, Rubus* spp., *Rubus* spp., *Viburnum lentago*, and *Viburnum recognitum (= Viburnum dentatum var. lucidum)*. The exotic shrubs *Elaeagnus angustifolia, Lonicera* spp., and *Rosa multiflora* may be invasive in some areas. Dry old-field grassland and shrublands are found on sandy or rocky substrates and is typically dominated by *Andropogon virginicus, Poa compressa, Schizachyrium scoparium, Solidago nemoralis*, and an assortment of dry weedy species such as the exotic *Centaurea stoebe ssp. micranthos*. Scattered native or exotic trees may be present, including *Acer rubrum, Fraxinus pennsylvanica, Pinus rigida, Pinus strobus, Pinus sylvestris*, and *Populus deltoides*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Species composition and dynamics in this division are influenced by fire frequency, land-use history, and herbivory, whether browsing by deer and grazing by cattle. Vegetation on shallow soils, exposed rock, or in rock crevices, is affected by hydrology and soil moisture. Low soil moisture on rock outcrops results in sparse vegetation and dwarf of stunted woody plant growth forms.

ENVIRONMENT

Environmental Description: *Climate:* The division occurs within two climate types (sensu Trewartha): Temperate Continental and Subtropical humid. There is a strong north-south temperature gradient in the region. A precipitation gradient extends east to west, with an average annual precipitation of 1620 mm at Greenville, North Carolina, to 1156 mm at Fayetteville, Arkansas. The annual average temperature in the southern extent of the division is 17.4°C (mean high of 32.7°C and a mean low 12.2°C) at Birmingham, Alabama, to -4.0°C in Quebec City (a mean high of 19.1°C in July and a mean low of -11.0°C).

*Soils/substrate:* The substrates are granite or rhyolite, limestone, metamorphic, sandstone, or serpentine. As a result, pH ranges from very acidic to basic. Soils range in depth from very deep to shallow or absent. Texture also is variable, from fine loamy to coarse soils. Specialized soil conditions also exist, such as those derived from novaculite and serpentine. Communities on shallow soils are subject to extremely xeric conditions in the summer months, whereas those in regions with cold winters and moist soils experience frost-heaving.

Distinct from these natural conditions are ruderal grasslands and shrublands found in the same climate and region, but typically occur on sites that have been cleared and plowed (for farming or development) and then abandoned, and are now dominated by weedy or generalist native and exotic forbs, grasses, ferns, and shrubs.

DISTRIBUTION

\*Geographic Range: Occurrences of this division can be found from the eastern seaboard of Atlantic Canada west to eastern Minnesota, south to the Ouachita Mountains and Ozark Plateau, and east to the Interior Low Plateaus, Appalachia Mountains, Piedmont and Atlantic Coast.

Nations: CA, US

States/Provinces: AL, AR, CT, GA, IA, IL, IN, KS, KY, LA, MA, MB, MD, ME, MI, MN, MO, NB, NC, ND, NE, NH, NJ, NS, NY, OH, OK, ON, PA, PE, QC, RI, SC, SD, TN, VA, VT, WI, WV

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M506 | Appalachian Rocky Felsic & Mafic Scrub & Grassland |
| M509 | Central Interior Acidic Scrub & Grassland |
| M508 | Central Interior Calcareous Scrub & Grassland |
| M505 | Laurentian-Acadian Acidic Rocky Scrub & Grassland |
| M507 | Laurentian-Acadian Calcareous Scrub & Grassland |
| M123 | Eastern North American Ruderal Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: B. Hoagland and D. Faber-Langendoen, in Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: B. Hoagland

Acknowledgments [optional]:

Version Date: 11 Jan 2016

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2. Shrub & Herb Vegetation

2.B.2.Nc. Eastern North American Grassland & Shrubland

M506. Appalachian Rocky Felsic & Mafic Scrub & Grassland

Type Concept Sentence: This vegetation macrogroup encompasses a variety of grass- and shrub-dominated communities, sometimes with scattered and/or stunted trees. This concept includes communities colloquially called balds, barrens, rock outcrops, and granitic flatrocks. Vegetation of this macrogroup is found in the Appalachian and Piedmont regions of the eastern United States with outliers in adjacent Canada.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nc. Eastern North American Grassland & Shrubland (D024)

Elcode: M506

\*Scientific Name: *Rhododendron catawbiense / Saxifraga michauxii - Danthonia compressa* Felsic & Mafic Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Catawba Rosebay / Michaux's Saxifrage - Flattened Oatgrass Felsic & Mafic Scrub & Grassland Macrogroup

\*Colloquial Name: Appalachian Rocky Felsic & Mafic Scrub & Grassland

\*Type Concept: This vegetation macrogroup encompasses a variety of grass- and shrub-dominated communities, sometimes with scattered and/or stunted trees, known colloquially as balds, barrens, flatrocks, rock outcrops, rocky domes, and rocky summits. They are found in the Appalachian and Piedmont regions of the eastern United States (with outliers in adjacent Canada), from higher to lower elevations. A suite of species tolerant of dry and rocky conditions are characteristic. At lower elevations this includes *Danthonia spicata, Dichanthelium* spp., and *Schizachyrium scoparium*, with trees including *Pinus virginiana, Quercus montana, Quercus stellata*, and/or *Quercus velutina*. At higher elevations this includes *Carex pensylvanica, Danthonia compressa, Huperzia selago, Minuartia groenlandica, Sibbaldiopsis tridentata*, and *Trichophorum cespitosum*. Shrubs may include *Kalmia latifolia, Rhododendron catawbiense*, and *Vaccinium corymbosum*. Appalachian oak barrens are dominated by grasses and shrubs, typically with scattered trees, including *Juniperus virginiana var. virginiana, Quercus marilandica, Quercus montana, Quercus stellata*, and/or *Quercus velutina* found on rocky substrates of a range of soil chemistries in the broadly-conceived Appalachian region. Appalachian balds may be dominated by shrubs or by graminoids and low forbs, and are found on higher peaks in the Southern Appalachians. The most characteristic species are *Carex pensylvanica, Danthonia compressa, Rhododendron catawbiense*, and *Sibbaldiopsis tridentata*. Granitic domes, flatrocks, and associated solution pools are found in the southern Piedmont of the United States. This vegetation is dominated by *Croton michauxii var. ellipticus, Minuartia glabra, Packera tomentosa, Schizachyrium scoparium*, and *Phemeranthus* spp., with *Diamorpha smallii* having high cover in some examples. The pools are distinctive and contain *Amphianthus pusillus*.

\*Diagnostic Characteristics: This macrogroup includes a variety of grass- and shrub-dominated communities, sometimes with scattered and/or stunted trees, found in the Appalachian and Piedmont regions of the eastern United States. This concept includes communities colloquially called balds, barrens, rock outcrops, and granitic flatrocks. It contains a diverse suite of physiognomies, including scattered trees over grasses and shrubs, to open grasslands, dense shrublands, and patchy herbaceous vegetation on rocky outcrops.

\*Classification Comments: This is a diverse macrogroup. Choosing a set of nominals for the scientific name was a challenge. There is not a nominal to represent the Piedmont flatrock component. Although many of the species listed do occur in Massachusetts, there are enough southern species that don't get to Massachusetts, and for those related occurrences, ~Laurentian-Acadian Acidic Rocky Scrub & Grassland Macrogroup (M505)$$ fits better.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M505 | Laurentian-Acadian Acidic Rocky Scrub & Grassland | is the related, but more northern and rocky type. |
| M509 | Central Interior Acidic Scrub & Grassland |  |
| M508 | Central Interior Calcareous Scrub & Grassland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup contains a diverse suite of physiognomies, including scattered trees over grasses and shrubs, to open grasslands, dense shrublands, and patchy herbaceous vegetation on rocky outcrops.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: A suite of species tolerant of dry and rocky conditions are generally characteristic of this vegetation. At lower elevations this includes *Danthonia spicata, Dichanthelium* spp., and *Schizachyrium scoparium*, with trees including *Pinus virginiana, Quercus montana (= Quercus prinus), Quercus stellata*, and/or *Quercus velutina*. At higher elevations this includes *Carex pensylvanica, Danthonia compressa, Huperzia selago, Minuartia groenlandica, Sibbaldiopsis tridentata*, and *Trichophorum cespitosum*. Shrubs may include *Kalmia latifolia, Rhododendron catawbiense*, and *Vaccinium corymbosum*. Appalachian oak barrens are dominated by grasses and shrubs, typically with scattered trees, including *Juniperus virginiana var. virginiana, Quercus marilandica, Quercus montana, Quercus stellata*, and/or *Quercus velutina*, found on rocky substrates of a range of soil chemistries in the broadly-conceived Appalachian region. Possible dominant graminoids include *Andropogon virginicus, Carex pensylvanica, Danthonia spicata, Deschampsia flexuosa, Elymus hystrix (= Hystrix patula), Piptochaetium avenaceum, Schizachyrium scoparium*, and *Sporobolus compositus*. Some other characteristic plants include *Cheilanthes lanosa, Phacelia dubia, Phlox subulata, Polygonatum biflorum, Polygonum scandens var. cristatum, Tradescantia virginiana*, and *Woodsia obtusa*. In more felsic examples, lichens (*Cladonia* spp.) and mosses are prominent on exposed rock. Appalachian balds may be dominated by shrubs or by graminoids and low forbs, and are found on higher peaks in the Southern Appalachians. The most characteristic species are *Carex pensylvanica, Danthonia compressa, Rhododendron catawbiense*, and *Sibbaldiopsis tridentata*. Granitic domes, flatrocks, and associated solution pools are found in the southern Piedmont of the United States. This vegetation is dominated by *Croton michauxii var. ellipticus (= Croton willdenowii), Minuartia glabra, Packera tomentosa, Schizachyrium scoparium*, and *Phemeranthus (= Talinum)* spp., with *Diamorpha smallii* having high cover in some examples. The pools are distinctive and contain *Amphianthus pusillus*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: These grass- and shrub-dominated communities, sometimes with scattered and or stunted trees, are known colloquially as balds, barrens, flatrocks, rock outcrops, rocky domes, and rocky summits.

DISTRIBUTION

\*Geographic Range: This vegetation is found from the northeastern U.S. south through the Central and Southern Appalachians, Cumberland Plateau, and Piedmont south to Georgia and Alabama, and includes an outlier in southern Ontario, Canada.

Nations: CA, US

States/Provinces: AL, CT, GA, KY, MA, MD, ME, NC, NH, NJ, NY, ON, PA, QC, RI?, SC, TN, VA, VT, WV

USFS Ecoregions (2007) [optional]: 221A:CC, 221D:CC, 231Aa:CCC, 231Af:CCC, 231Ic:CCC, 232A:CC, 232I:CC, M221Dc:CCC, M221Dd:CCC

Omernik Ecoregions L3, L4 [optional]: 8.3.4.45b:C, 8.3.4.45f:C, 8.4.4.66i:C

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G658 | Southern Appalachian Shrub Bald |
| G657 | Southern Appalachian Grass Bald |
| G180 | Appalachian Mafic Glade |
| G670 | Central & Southern Appalachian Rocky Outcrop |
| G789 | North-Central Appalachian Acidic Scrub & Grassland |
| G671 | Piedmont Dome & Flatrock Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-07-24 | M163 Eastern North American Prairie & Barrens Macrogroup | M163 split into M505, M506, M507, M508, M509 |
| 2012-07-24 | M122 Appalachian & Laurentian Rocky Scrub & Meadow Macrogroup | M122 split into M505 & M506 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M. Pyne, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne

Acknowledgments [optional]:

Version Date: 06 Jan 2016

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2. Shrub & Herb Vegetation

2.B.2.Nc. Eastern North American Grassland & Shrubland

M509. Central Interior Acidic Scrub & Grassland

Type Concept Sentence: These open acidic, rocky grasslands (glades, barrens and outcrops) are dominated by *Schizachyrium scoparium, Sorghastrum nutans, Danthonia sericea*, and *Danthonia spicata* with scattered *Pinus* spp. and *Quercus* spp. trees and are found in the central Midwest and south-central Interior Highlands of the eastern United States.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nc. Eastern North American Grassland & Shrubland (D024)

Elcode: M509

\*Scientific Name: *Schizachyrium scoparium - Danthonia sericea* Acidic Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Little Bluestem - Silky Oatgrass Acidic Scrub & Grassland Macrogroup

\*Colloquial Name: Central Interior Acidic Scrub & Grassland

\*Type Concept: This macrogroup represents grasslands, shrublands, and scattered trees, often co-occurring in a mosaic with woodlands on quartzite, sandstone or other outcrops of acidic rock and associated thin-soil areas, primarily in unglaciated regions. The acidic soils are typically dry during the summer and autumn, becoming saturated during the winter and spring. Grasses such as *Schizachyrium scoparium* and *Sorghastrum nutans* dominate this macrogroup. Other characteristic grasses include *Danthonia sericea* and *Danthonia spicata*. Shrubs such as *Vaccinium* spp. and/or *Gaylussacia* spp. are common, as are scattered trees of *Pinus virginiana, Pinus rigida, Pinus echinata, Quercus montana, Quercus stellata*, and *Quercus marilandica*. Trees may be stunted. *Juniperus virginiana var. virginiana* can be present and often increases in the absence of fire. Herbaceous plants, including *Diamorpha smallii* and *Minuartia glabra*, are found on some of these outcrops on the Cumberland Plateau in Tennessee. Fruticose lichens such as *Cladonia* spp. may be prominent in some examples. Examples of the macrogroup are influenced by drought and infrequent to occasional fires. Prescribed fires can help maintain an open grassland or woodland structure. Examples of this macrogroup are primarily found in the Interior Highlands (Ozarks, Ouachita Mountains, Interior Low Plateau, and Cumberland Plateau regions) with rare and limited occurrences north and south of this range.

\*Diagnostic Characteristics: These are open grasslands with scattered trees and small rock outcrops which are on thin-soil acidic glades in the central and south-central United States. *Schizachyrium scoparium, Danthonia sericea*, and *Danthonia spicata* are common dominants. *Dichanthelium acuminatum, Dichanthelium linearifolium*, and *Dichanthelium sphaerocarpon* are common associates on these acidic glades. Shrubs which favor acidic soils such as *Vaccinium* spp. and/or *Gaylussacia* spp. are common, as are widely scattered trees of *Pinus virginiana, Pinus rigida, Pinus echinata, Quercus montana, Quercus stellata, Quercus marilandica*, and *Ulmus alata*. Herbaceous plants, including *Diamorpha smallii* and *Minuartia glabra*, are typical of these outcrops on the Cumberland Plateau in Tennessee. A diverse set of graminoid and forb species occurs on these glades, but rangewide review is needed to identify the diagnostic species.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M012 | Central Midwest Oak Forest, Woodland & Savanna |  |
| M016 | Southern & South-Central Oak - Pine Forest & Woodland |  |
| M508 | Central Interior Calcareous Scrub & Grassland |  |
| M505 | Laurentian-Acadian Acidic Rocky Scrub & Grassland | occurs further north and northeast, in northeastern West Virginia and in Virginia in the Blue Ridge of the Central Appalachian area. |
| M506 | Appalachian Rocky Felsic & Mafic Scrub & Grassland |  |

Similar NVC Types General Comments [optional]: This macrogroup is distinguished from other macrogroups with similar vegetation by its occurrence on acidic rock outcrops (primarily sandstone) and surrounding thin soil areas in the Interior Highlands including the Ozarks, Ouachita Mountains, Interior Low Plateau, and Cumberland Plateau regions. Other similar vegetation occurs in colder climates, on igneous or circumneutral substrates, such as those derived from limestone or dolomite.

VEGETATION

Physiognomy and Structure Summary: The vegetation encompasses a complex of sparsely vegetated rock outcrops, perennial grasslands, and scattered heath shrubs and trees on shallow soils.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Grasses such as *Schizachyrium scoparium* and *Sorghastrum nutans* dominate these stands, with scattered stunted oak species, including *Quercus montana (= Quercus prinus), Quercus stellata*, and Quercus marilandica, other shrubby trees such as *Celtis tenuifolia* and *Juniperus virginiana*, and shrub species such as *Vaccinium* spp. (including *Vaccinium arboreum*) and *Gaylussacia* spp. Other herbaceous plants that may be associated with these glades include *Andropogon ternarius, Coreopsis grandiflora, Coreopsis lanceolata, Croton michauxii var. ellipticus (= Croton willdenowii), Danthonia sericea, Danthonia spicata, Dichanthelium acuminatum, Dichanthelium linearifolium, Dichanthelium sphaerocarpon, Pityopsis graminifolia var. latifolia, Portulaca pilosa, Sedum nuttallianum, Selaginella rupestris, Silene regia, Silene rotundifolia*, and *Symphyotrichum patens var. patentissimum* (Nelson 2005). Herbaceous plants, including *Diamorpha smallii* and *Minuartia glabra*, are typical of the outcrops on the Cumberland Plateau in Tennessee. *Pinus virginiana* and *Acer rubrum* are typical of the current condition of many of the woodlands surrounding these outcrops on the Cumberland Plateau; *Pinus rigida* and/or *Pinus echinata* may also occur. Moss and lichen cover and diversity can be high (Nelson 2005). A fuller description of the characteristic species combination of vascular and nonvascular plants is needed for this macrogroup (Winterringer and Vestal 1956, Voigt and Mohlenbrock 1964, Baskin and Baskin 1988, Quarterman et al. 1993, Heikens and Robertson 1995, Taft 1997b, Nelson 2005).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Examples of this macrogroup are influenced by drought and infrequent to occasional fires. Prescribed fires can be helpful for managing stands of this macrogroup by promoting an open glade structure. Droughts and deer browse may currently interact to keep these glades open. Historically, the surrounding matrix of dry oak woodlands may have been more likely to burn, and those fires and the more open canopy could have spread into the glades (West and Welsh 1998). These glades are thought to be more environmentally controlled, by shallow soils, which suggest that soil depth and the historic extent of the glade community may be related.

ENVIRONMENT

Environmental Description: *Climate:* Humid cool temperate. In summer, glades may become extremely hot, and in the most exposed situations support only the most heat- and drought-tolerant taxa. *Soil/substrate/hydrology:* This macrogroup occurs on flat outcrops of sandstone rock and along moderate to steep slopes or valley walls of rivers along most aspects. Parent material is sandstone, but also includes chert, shale, quartzite or rhyolite, novaculite, igneous quartzite or nepheline syenite bedrock with well- to excessively well-drained, shallow soils interspersed with rock and boulders. Substrates include quartzite or sandstone or other outcrops of acidic rock and associated thin-soil areas over these types of rock. Some areas are really prone to wetness in the winter and spring.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs west of the Blue Ridge, in the central states. Examples of this macrogroup are found in the Interior Highlands of the Ozark, Ouachita, and Interior Low Plateau regions, as well on the Cumberland Plateau of Kentucky, Tennessee, Alabama, Georgia, Virginia, and likely West Virginia, with rare and limited occurrences in the Baraboo Hills of Wisconsin.

Nations: US

States/Provinces: AL, AR, GA, IL, IN, KY, MO, OH, OK, TN, VA, WI, WV

USFS Ecoregions (2007) [optional]: 221E:CC, 221H:CC, 223A:CC, 223B:CC, 223D:CC, 223G:CC, 231C:CC, 231H:CC, 251C:CC, M223A:CC, M231A:CC

Omernik Ecoregions L3, L4 [optional]: 8.3.7.35a:C, 8.3.7.35e:C

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]: This is a distinctive environment, with distinctive vegetation patterns and locally endemic species. There is much variation among the associations, but many wide-ranging grass species are in common across association examples.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G178 | Central Interior Acidic Open Glade & Barrens |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-07-24 | M163 Eastern North American Prairie & Barrens Macrogroup | M163 split into M505, M506, M507, M508, M509 |
| 2012-07-24 | M124 Northern & Central Alvar & Glade Macrogroup | M124 split into M507, M508, M509 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Sandstone Glade | Nelson 2005 |  |
| = | Sandstone Glades | Baskin and Baskin 1988 |  |
| = | Sandstone Outcrops (Glades) | Quarterman et al. 1993 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: E. Quarterman, M.P. Burbank, and D.J. Shure (1993)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C.W. Nordman

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.2.Nc. Eastern North American Grassland & Shrubland

M508. Central Interior Calcareous Scrub & Grassland

Type Concept Sentence: These glades, barrens and patch prairies are open shrublands or grasslands composed of *Schizachyrium scoparium, Sporobolus* spp., and other native warm-season grasses on thin soils and outcrops of alkaline or circumneutral rock which is of sedimentary, meta-sedimentary, igneous or metamorphic origin occurring in the east-central United States, including the Interior Highlands and Central Appalachian region.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nc. Eastern North American Grassland & Shrubland (D024)

Elcode: M508

\*Scientific Name: *Schizachyrium scoparium - Sporobolus* spp. Central Interior Calcareous Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Little Bluestem - Dropseed species Central Interior Calcareous Scrub & Grassland Macrogroup

\*Colloquial Name: Central Interior Calcareous Scrub & Grassland

\*Type Concept: This vegetation macrogroup includes open barrens (or prairie) vegetation of the east-central United States. Physiognomy is variable, with management or natural disturbance. These are plant communities with open canopies, ranging from herbaceous-dominated barrens (some of which are maintained today by mowing instead of fire and grazing) through savanna and woodland types. The variety of relatively open habitats that is present here includes open grassland areas, as well as savanna woodlands. Stands are dominated by grasses and forbs with scattered shrubby vegetation and, occasionally, trees. The primary dominant grasses include *Andropogon gerardii* (southward also *Andropogon glomeratus, Andropogon gyrans, Andropogon ternarius*), *Panicum* spp., *Schizachyrium scoparium, Sorghastrum nutans*, and *Sporobolus* spp. Some other typical species found in examples may include *Helianthus mollis, Helianthus occidentalis, Helianthus silphioides, Panicum anceps, Silphium terebinthinaceum*, and *Silphium trifoliatum*. The shrublands can be dominated by *Cercis canadensis, Forestiera ligustrina, Hypericum* spp., *Juniperus virginiana var. virginiana*, and *Rhus aromatica*. The scattered trees (under historical or current managed conditions) are primarily *Quercus muehlenbergii, Quercus alba*, and *Quercus macrocarpa*. Under current conditions, *Acer rubrum, Liquidambar styraciflua, Quercus coccinea*, and *Quercus falcata* may be present, but these species are not characteristic. In the Appalachians, most examples are open woodlands with *Pinus rigida, Pinus virginiana, Juniperus virginiana var. virginiana*, and/or *Quercus alba, Quercus marilandica*, and *Quercus stellata* in the often stunted canopy. Trees can include *Fraxinus americana, Ulmus alata*, and *Cercis canadensis* on basic soil examples. This vegetation was formerly more widespread, but is now found in relatively scattered and isolated remnants. Some proposed factors which have functioned to maintain the openness of these vegetation types include the droughty, gravelly soils and resulting stresses to vegetation, as well as fire and grazing.

\*Diagnostic Characteristics: These are open shrublands or grasslands on thin soils and outcrops of alkaline or circumneutral rock of sedimentary, meta-sedimentary, igneous or metamorphic origin. *Schizachyrium scoparium* is a common dominant perennial grass species; *Sporobolus* spp. are also important distinguishing grasses, along with *Andropogon gerardii* (southward also *Andropogon glomeratus, Andropogon gyrans, Andropogon ternarius*), *Panicum anceps*, and *Sorghastrum nutans*. Forbs include *Helianthus mollis, Helianthus occidentalis, Helianthus silphioides, Silphium terebinthinaceum*, and *Silphium trifoliatum*. Diagnostic shrubs include *Cercis canadensis, Forestiera ligustrina, Hypericum* spp., *Juniperus virginiana var. virginiana*, and *Rhus aromatica*. The scattered trees are primarily *Quercus muehlenbergii, Quercus alba*, and *Quercus macrocarpa*. In the Appalachians, most examples are open woodlands with *Pinus rigida, Pinus virginiana, Juniperus virginiana var. virginiana*, and/or *Quercus alba, Quercus marilandica*, and *Quercus stellata* in the often stunted canopy. Trees can include *Fraxinus americana, Ulmus alata*, and *Cercis canadensis*.

\*Classification Comments: Included here are open rock outcrops and related thin-soil annual and perennial grasslands and shrublands, from southern Ohio to Pennsylvania, southwest across the Interior Highlands of Indiana, Illinois and Missouri, south to Georgia and west to Arkansas and Oklahoma. These are open shrublands or grasslands on thin soils and outcrops of alkaline or circumneutral rock of sedimentary, meta-sedimentary, igneous or metamorphic origin. Similar vegetation in the Great Lakes region (alvars) and in Connecticut and Massachusetts are included in ~Laurentian-Acadian Calcareous Scrub & Grassland Macrogroup (M507)$$.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M509 | Central Interior Acidic Scrub & Grassland | occurs on acidic substrates, such as sandstone |
| M507 | Laurentian-Acadian Calcareous Scrub & Grassland | occurs further north, in the Great Lakes region and in Connecticut and Massachusetts. |
| M506 | Appalachian Rocky Felsic & Mafic Scrub & Grassland | is Appalachian and occurs predominantly on acidic soils and outcrops. |

Similar NVC Types General Comments [optional]: M509 differs in that M508 is on thin soils and outcrops of alkaline or circumneutral rock. The distribution of M507 southward needs to be reconciled with M508.

VEGETATION

Physiognomy and Structure Summary: This vegetation is primarily dominated by perennial grasses, but includes sparsely vegetated rock outcrops, annual and perennial grasslands, shrublands, and grasslands with very widely scattered trees.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The primary dominant grasses include *Schizachyrium scoparium* and native warm season grasses. Thin soil areas may be dominated by include *Sporobolus vaginiflorus*, or *Sporobolus neglectus*. Other more mesic perennial grasses such as *Andropogon gerardii*, or *Tripsacum dactyloides* are found in deeper soil mesic and wet sites. Some typical graminoid species (varying with latitude and biogeography) include *Andropogon gerardii, Andropogon glomeratus, Andropogon gyrans, Andropogon ternarius, Aristida purpurascens var. virgata, Calamagrostis coarctata (= Calamagrostis cinnoides), Chasmanthium laxum, Dichanthelium aciculare, Dichanthelium dichotomum, Dichanthelium scoparium, Dichanthelium sphaerocarpon var. isophyllum, Gymnopogon brevifolius, Panicum anceps, Panicum rigidulum, Panicum verrucosum, Panicum virgatum*, and *Sporobolus clandestinus*. Other characteristic herbs may include *Aletris farinosa, Coreopsis major, Coreopsis tripteris, Doellingeria umbellata, Eutrochium fistulosum, Eupatorium perfoliatum, Eupatorium pilosum, Eupatorium rotundifolium, Eurybia hemispherica, Helianthus angustifolius, Helianthus hirsutus, Helianthus mollis, Helianthus occidentalis, Helianthus silphioides, Lobelia puberula, Polytrichum commune, Potentilla simplex, Pteridium aquilinum, Sericocarpus linifolius, Silphium terebinthinaceum, Silphium trifoliatum, Solidago juncea, Solidago odora, Solidago rugosa*, and *Symphyotrichum dumosum*. The scattered trees are primarily *Quercus muehlenbergii, Quercus alba*, and *Quercus macrocarpa*. In the Appalachians, most examples are open woodlands with *Pinus rigida, Pinus virginiana, Juniperus virginiana var. virginiana*, and/or *Quercus alba, Quercus marilandica*, and *Quercus stellata* in the often stunted canopy. Trees can include *Fraxinus americana, Ulmus alata*, and *Cercis canadensis*. Dominant or abundant *Juniperus virginiana var. virginiana* or other trees on these thin-soil areas is probably related to a lack of fire, grazing or drought conditions.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Due to the effects of periodic drought and winter frost-heaving, the thin rocky soils generally do not support forest vegetation. The perennial grasslands may accumulate fuel from dried drought-killed trees and may be prone to wildfire. Fires may play an important role in keeping the structure of the vegetation open and perennial grass- or shrub-dominated. Grazing and the harvesting of *Juniperus virginiana var. virginiana* trees also have played a role in keeping sites open, rather than forested (DeSelm 1994). The cessation of disturbances, such as grazing, harvesting of trees, and burning these habitats, has enabled many of the perennial grasslands to become completely dominated by *Acer rubrum, Juniperus virginiana var. virginiana, Liquidambar styraciflua, Quercus alba, Quercus falcata, Quercus stellata*, and/or the invasive exotic shrubs *Ligustrum sinense* or *Lonicera maackii*.

ENVIRONMENT

Environmental Description: Site conditions and environment are characterized by thin soils over rock, usually with rock outcrops, and typically with higher pH. These areas are subject to extremes of temperature, and short-term drought can have extreme effects on the plants. In addition, wetness in the winter and frost-heaving can be pronounced. *Climate:* Humid warm temperate, humid cool temperate. *Soil/substrate/hydrology:* The substrate includes outcrops and thin soils (i.e., <20 cm soil depth) and outcrops of alkaline or circumneutral rock of sedimentary, meta-sedimentary, igneous or metamorphic origin. These can be flat as on limestone in the Nashville Basin or on slopes as in the dolomites and limestones of the Interior Highlands, in Southeast Ohio, Indiana and Illinois, the Ozark and Ouachita mountains, the Western Valley of the Tennessee River, and the Ketona dolomite in central Alabama, or amphibolite, serpentine or shale of the Appalachians. Examples of this vegetation also occur on dry soils with limited moisture availability during the summer, such as occur over gravels or which have a fragipan. Generally the hydrology is dry upland, but there can be small saturated wetland inclusions which may support rare plant species.

DISTRIBUTION

\*Geographic Range: Included here are open rock outcrops and related dry-soil or thin-soil annual and perennial grasslands and shrublands of the Interior Highlands and Central Appalachian region, from southern Missouri to Ohio and Pennsylvania, south to Arkansas, Oklahoma and Georgia.

Nations: US

States/Provinces: AL, AR, GA, IL, IN, KY, LA, MD, MO, NC, NJ, OH, OK, PA, SC, TN, VA, WV

USFS Ecoregions (2007) [optional]: 221A:CC, 221D:CC, 221E:CC, 221H:CC, 221J:CC, 223B:CC, 223D:CC, 223E:CC, 223F:CC, 231A:CC, 231C:CC, 231D:CC, 231I:CC, M221A:CC, M221D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: This is a distinctive alkaline to circumneutral grassland and glade environment, with great physiognomic contrast between this and surrounding forest vegetation on deeper soils. In addition, there are distinctive vegetation patterns and locally endemic and disjunct species. There is much variation among the associations in terms of these regional glade endemics and disjuncts, but wide-ranging grass species are in common across association examples.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G174 | South-Central Patch Prairie |
| G179 | Central Interior Alkaline Open Glade & Barrens |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-07-24 | M163 Eastern North American Prairie & Barrens Macrogroup | M163 split into M505, M506, M507, M508, M509 |
| 2012-07-24 | M124 Northern & Central Alvar & Glade Macrogroup | M124 split into M507, M508, M509 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Grass-Dominated Communities | DeSelm and Murdock 1993 |  |
| < | Limestone Cedar Glades | Lawless et al. 2006 |  |
| < | Rock Outcrop Communities: Limestone | Quarterman et al. 1993 |  |
| < | Xeric Limestone Prairie | Lawless et al. 2006 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D. Faber-Langendoen, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C.W. Nordman

Acknowledgments [optional]: The recent work of Lawless, Baskin and Baskin is gratefully acknowledged. Elsie Quarterman's 1950 Ecology paper, "Major plant communities of Tennessee cedar glades" remains a starting point for understanding these ecosystems and their plant communities. Her pioneering work is acknowledged.

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.2.Nc. Eastern North American Grassland & Shrubland

M505. Laurentian-Acadian Acidic Rocky Scrub & Grassland

Type Concept Sentence: This macrogroup comprises infertile scrub vegetation characterized by variable cover of ericaceous shrubs or heath, graminoids, lichens, mosses, and occasional scattered trees, occurring on sandplains and rock outcrops in cool temperate regions of northeastern and north-central North America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nc. Eastern North American Grassland & Shrubland (D024)

Elcode: M505

\*Scientific Name: Laurentian-Acadian Acidic Rocky Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Laurentian -Acidic Rocky Scrub & Grassland Macrogroup

\*Colloquial Name: Laurentian-Acadian Acidic Rocky Scrub & Grassland

\*Type Concept: This macrogroup comprises infertile scrub vegetation characterized by variable cover of shrubs, herbs, lichens, and occasional scattered trees, occurring on sandplains and rock outcrops in cool temperate regions of northeastern and north-central North America. Ericaceous shrubs or heath (*Gaylussacia baccata, Kalmia angustifolia, Vaccinium angustifolium, Vaccinium myrtilloides, Vaccinium pallidum*), scrub oaks (*Quercus ilicifolia* or *Quercus prinoides*), stunted oaks (*Quercus rubra*), and dwarf-shrubs (*Arctostaphylos uva-ursi, Corema conradii, Gaultheria procumbens, Leiophyllum buxifolium, Pyxidanthera barbulata*) characterize this vegetation throughout its range. Graminoids are mostly dominant in the herb layer and include *Carex lucorum, Carex pensylvanica, Danthonia spicata, Deschampsia flexuosa, Schizachyrium scoparium*, and/or the non-native *Poa compressa*. *Pteridium aquilinum* is a common fern. Nonvascular species are often important and may include mosses (e.g., *Dicranum* spp., *Polytrichum* spp.) and/or fruticose lichens (e.g., *Cladonia* spp.). Climate is north-temperate, continental to coastal. This vegetation develops in settings within this primarily forested region where exposed, dry, acidic, nutrient-poor conditions do not sustain forest vegetation.

\*Diagnostic Characteristics: Patchy, shrub-dominated vegetation of infertile, generally acidic substrates, including rock outcrops and sandplains (relatively flat to rolling sandy regions). Characteristic taxa are species of *Vaccinium* and other ericaceous shrubs or heath, *Arctostaphylos uva-ursi, Corema conradii, Danthonia spicata, Juniperus communis, Quercus ilicifolia, Sibbaldiopsis tridentata*, and in the New Jersey pine plains, dwarfed *Leiophyllum buxifolium, Pinus rigida* and *Pyxidanthera barbulata*.

\*Classification Comments: This macrogroup includes pine plains characterized by dwarfed *Pinus rigida*, restricted to the New Jersey Pine Barrens and Long Island, New York, as well as vegetation of serpentine rock in northern New England. The relationship of the latter to serpentine vegetation of the Gaspe Peninsula, Quebec, requires further analysis.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M502 | Appalachian-Northeastern Oak - Hardwood - Pine Forest & Woodland | has broadly similar herbaceous and shrub layers in woodland portions occurring on acidic, infertile substrates. |
| M506 | Appalachian Rocky Felsic & Mafic Scrub & Grassland |  |
| M509 | Central Interior Acidic Scrub & Grassland |  |

Similar NVC Types General Comments [optional]: The distribution of ~Central Interior Calcareous Scrub & Grassland Macrogroup (M508)$$ northward and this macrogroup (M505) southward needs to be resolved.

VEGETATION

Physiognomy and Structure Summary: This vegetation may be shrub-, dwarf-shrub-, or herb-dominated, but is most often a patchwork of more than one physiognomy. Trees may be present, but are generally stunted in growth form (<2 m) and with low cover (<25%). Bare or lichen-encrusted rock may dominate large areas.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Ericaceous shrubs or heath (*Gaylussacia baccata, Kalmia angustifolia, Vaccinium angustifolium, Vaccinium myrtilloides, Vaccinium pallidum*), scrub oaks (*Quercus ilicifolia* or *Quercus prinoides*), stunted oaks (*Quercus rubra*) and maples (*Acer rubrum*), and dwarf-shrubs (*Arctostaphylos uva-ursi, Corema conradii, Gaultheria procumbens, Leiophyllum buxifolium, Pyxidanthera barbulata*) characterize this vegetation throughout its range. Graminoids are mostly dominant in the herb layer and include *Carex lucorum, Carex pensylvanica, Danthonia spicata, Deschampsia flexuosa, Schizachyrium scoparium*, and/or the non-native *Poa compressa*. *Pteridium aquilinum* is a common fern. *Comptonia peregrina* is common in parts of the range. Nonvascular species are often important and may include mosses (e.g., *Dicranum* spp., *Polytrichum* spp.) and/or fruticose lichens (e.g., *Cladonia* spp.). When present, trees may include scattered individuals of *Acer rubrum, Betula* spp., *Pinus* spp., *Prunus pensylvanica, Prunus serotina, Quercus* spp., and other taxa that can colonize dry, open areas.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Exposure and occasional fire are the major factors keeping this vegetation relatively open on bedrock settings, while frequent fire is more typical in sandplains. Land-use history may be very important in creating or expanding thin soil on rock outcrops and in expanding pitch pine - scrub oak communities on sand (P. Swain pers. comm. 2014). Grazing by sheep on mountains has been considered to be a cause of soil loss and expansion of outcrop communities, similar to what has been reported on coastal New England sandplains (Motzkin and Foster 2002).

ENVIRONMENT

Environmental Description: Climate is north-temperate, continental to coastal. This vegetation develops in settings within this primarily forested region where exposed, dry, nutrient-poor conditions and fire do not easily sustain forest vegetation. Sand barrens examples can be common in regions with extensive sandplains, with relatively flat to rolling sandy soils. The substrate is rock or sand, with thin or localized areas of nutrient-poor soil. Substrate chemistry is usually acidic and nutrient-poor to (rarely) ultramafic. The substrate hydrology is largely very well- to excessively well-drained, except for small pockets within the expanses of rock that may accumulate runoff and precipitation.

DISTRIBUTION

\*Geographic Range: This macrogroup ranges across southeastern Canada from the Maritime Provinces to the Great Lakes, and south through the northeastern and upper midwestern U.S. to New Jersey, Pennsylvania, Ohio, and the mountains of Virginia and West Virginia.

Nations: CA, US

States/Provinces: CT, MA, ME, MI, MN, NB, NH, NJ, NS, NY, OH, ON, PA, QC, RI, VA, VT, WI

USFS Ecoregions (2007) [optional]: 211A:CC, 211B:CC, 211C:CC, 211D:CC, 211E:CC, 211F:CC, 211I:CC, 212Jb:CCC, 212Jc:CCC, 212Jo:CCP, 212K:CC, 212Lb:CPP, 212M:CC, 212Q:CC, 212Sb:CCC, 212Sc:CCP, 212Sn:CCP, 212Sq:CCC, 212Tc:CCC, 212X:CC, 212Ya:CCC, 221A:CC, 221B:CC, M211A:CC, M211Bb:CCC, M211Bd:CCC, M211C:CC, M211D:CC, M221A:CC, M221B:CP

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G788 | Laurentian-Acadian Acidic Scrub & Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-05-06 | M127 Eastern North American Sub-boreal Shrubland & Grassland Macrogroup | M127 split & merged with M505 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Dwarf Pine Plains | Whittaker 1979a |  |
| < | Heath | Latham et al. 1996 |  |
| < | Heath-mat association type | Hill 1923 |  |
| < | Pine-heath | Harshberger 1918 |  |
| < | Plain Formation (Coremal) | Harshberger 1916 |  |
| < | Rhodora | Latham et al. 1996 |  |
| < | Rock Outcrop System, Northern Floristic Region | Minnesota DNR 2003 |  |
| < | Scrub Oak Barrens | Latham et al. 1996 |  |
| < | Southern Ontario Granite Barrens | Catling and Brownell 1999 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.W. Harshberger (1916); A.F. Hill (1923); P.M. Catling and V.R. Brownell (1999)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S.C. Gawler and L. Sneddon

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.2.Nc. Eastern North American Grassland & Shrubland

M507. Laurentian-Acadian Calcareous Scrub & Grassland

Type Concept Sentence: This macrogroup encompasses open shrub, stunted or very sparse tree, and herb calcareous rocky vegetation, including rocky outcrops and limestone pavements (alvars). It is found in isolated patches in the Laurentian-Acadian region of southeastern Canada and the northeastern United States.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nc. Eastern North American Grassland & Shrubland (D024)

Elcode: M507

\*Scientific Name: *Dasiphora fruticosa ssp. floribunda - Carex eburnea* Calcareous Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Shrubby-cinquefoil - Bristleleaf Sedge Calcareous Scrub & Grassland Macrogroup

\*Colloquial Name: Laurentian-Acadian Calcareous Scrub & Grassland

\*Type Concept: This macrogroup encompasses calcareous outcrops and alvar grasslands and shrublands that occur in isolated patches in the Laurentian-Acadian region of southeastern Canada and the northeastern United States. Alvars are well-described, and are found in the temperate-boreal transition of the Great Lakes and Lake Winnipeg basins. They are characterized by distinctive scrub and herb flora, of eastern tallgrass prairie elements and eastern subboreal elements, with less than 10% tree cover. Alvars occur both as open grasslands and pavements, with shrubs <25% cover and as shrublands, where shrubs are >25%. Common alvar species include *Carex crawei, Carex scirpoidea, Danthonia spicata, Deschampsia cespitosa, Eleocharis compressa, Juniperus horizontalis, Packera paupercula, Schizachyrium scoparium*, and *Sporobolus heterolepis*. In more exposed areas, there is a mosaic of mossy patches and exposed bedrock that is covered with crustose and foliose lichens. In shrubby areas, the dominant shrub is the short to tall shrub *Juniperus communis*, mixed with *Juniperus horizontalis* and/or *Dasiphora fruticosa ssp. floribunda*, or a mix of scrub forms of tree species such as *Abies balsamea, Larix laricina, Picea glauca*, and *Thuja occidentalis*. Alvars are maintained by associated geologic, hydrologic, and other landscape processes. In particular, most types of alvar tend to flood each spring, then experience moderate to severe drought in summer months. They include open pavement, grassland, and shrubland/woodland types. Alvar communities occur in an ecological matrix with similar bedrock and hydrologically influenced communities. Four key ecological processes influence Great Lakes alvar communities: (1) hydrology and soil moisture regime, (2) fire regime and land-use history, (3) herbivory: browsing by deer and grazing by cattle, and (4) the invasion of exotic plant species. Calcareous rocky outcrops are poorly described in the region.

\*Diagnostic Characteristics: Calcareous scrubby-herb vegetation is characterized by a variable physiognomy, from open perennial (rarely annual) grassland or shrubland and nonvascular pavement (5-25% herb and/or shrub cover) to dense grassland or shrubland (>25%) with scattered evergreen needleleaf (more rarely broadleaf deciduous) trees <10% (variable). Species composition contains a mix of calciphilic, sometimes prairie grasses and sub-boreal to boreal shrubs and trees. Sites are on shallow soils over limestone, limestone pavement or alkaline rocky outcrops. Key dominants and differentials on alvars include the perennials *Schizachyrium scoparium, Sporobolus heterolepis, Danthonia spicata*, and *Deschampsia cespitosa* (wet to moist areas); *Sporobolus neglectus, Sporobolus vaginiflorus*, and *Panicum philadelphicum* occur in areas with the thinnest soils, typically along the margins of exposed pavement. Key shrubs, when present, are *Dasiphora fruticosa ssp. floribunda, Juniperus communis, Juniperus horizontalis*, and *Rhus aromatica*. Trees, when present, include *Pinus banksiana* (in more northern sites), *Picea glauca, Thuja occidentalis*, and *Quercus macrocarpa* or *Quercus muehlenbergii* (more southern sites).

Key characteristics of other calcareous vegetation needs to be documented.

\*Classification Comments: Excluded from the alvar concept are limestone bedrock lakeshore and rivershore pavement grasslands, and various limestone woodlands. These lack the typical diagnostic species of alvar (Reschke et al. 1998). Limestone spare woodlands (savannas) and woodlands, with >10% tree cover, are treated with ~Laurentian-Acadian Limestone Woodland Group (G655)$$ in ~Laurentian-Acadian Pine - Hardwood Forest & Woodland Macrogroup (M159)$$. Juniper shrublands lack many of the diagnostic species common in grassland alvars, and further review is needed to resolve their placement.

Distribution in Lower New England states is uncertain. Depending on whether ~Central Interior Calcareous Scrub & Grassland Macrogroup (M508)$$ extends to Massachusetts and Connecticut for calcareous/circumneutral outcrops (currently M508 does not), Massachusetts and probably Connecticut have small outlying occurrences; not alvar, but outcrops (e.g., Massachusetts Calcareous Rocky Summit / Rock Outcrop Community). See also Weatherbee (1996) for Massachusetts and state classifications for Connecticut, Massachusetts, and Vermont (P. Swain pers. comm. 2014).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M508 | Central Interior Calcareous Scrub & Grassland |  |
| M057 | Eastern North American Coastal Dune & Grassland |  |

Similar NVC Types General Comments [optional]: The distribution northward of ~Central Interior Calcareous Scrub & Grassland Macrogroup (M508)$$ with respect to this macrogroup (M507) needs to be resolved.

VEGETATION

Physiognomy and Structure Summary: Calcareous scrub (low shrubs, stunted or sparse tree) and herb vegetation has very few trees (<10% cover of trees over 5 m tall), a variable cover of shrubs and herbaceous plants, often with exposed bedrock, which may be covered with crustose lichens, mosses, and blue-green algal mats in low-lying areas where water pools. Physiognomy varies from open nonvascular pavement with scattered vascular plants, to grassland, and shrubland or scrub types.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Alvars are well-described and are found in the temperate-boreal transition of the Great Lakes and Lake Winnipeg basins. Great Lakes alvars are characterized by distinctive scrub (shrub?) and herb flora of western, northern and southern species, depending on where in the basin they occur, with <10% tree cover. Alvars occur both as open grasslands and pavements, with shrubs <25% cover and as shrublands, where shrubs are >25%. Common alvar species include *Carex crawei, Carex scirpoidea* (only on Bruce Peninsula and Manitoulin Island in Ontario), *Deschampsia cespitosa* (not an alvar indicator, found on rocky areas near water throughout Ontario), *Eleocharis compressa, Juniperus horizontalis, Packera paupercula (= Senecio pauperculus), Schizachyrium scoparium*, and *Sporobolus heterolepis*. *Trichostema brachiatum (= Isanthus brachiatus), Panicum philadelphicum*, and *Scutellaria parvula* are common in all alvars, much more so than *Carex scirpoidea*. In more exposed areas, there is a mosaic of mossy patches and exposed bedrock that is covered with crustose and foliose lichens. In shrubby areas, the dominant shrub is the short to tall shrub *Juniperus communis*, mixed with *Juniperus horizontalis* and/or *Dasiphora fruticosa ssp. floribunda (= Pentaphylloides floribunda), Rhus aromatica*, or a mix of scrub forms of tree species such as *Abies balsamea, Larix laricina, Picea glauca*, and *Thuja occidentalis*.

Further information on other calcareous stands is needed. See Lee et al. (1998) for information in southern Ontario, and state Natural Heritage Program classifications and Weatherbee (1996) in New England.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: In Great Lakes alvars, natural fires appear always to have been at least an incidental part of their history, and probably instrumental in maintaining some alvar types, such as juniper alvar shrubland. But based on evidence from alvars that are open with old trees and have no burn evidence, it is clear that not all alvars require fire to remain in an open state. Therefore, the use of fire as a management tool is not advised for all alvar community types (Reschke et al. 1998). Alvars in the Great Lakes basin and elsewhere have long been influenced by grazing livestock. Brownell (1998) has noted that where grazing is intense on Great Lakes alvar grasslands, the grasses may be reduced and that species avoided by cattle such as *Eleocharis compressa* may increase in abundance. Rosette-forming species such as *Symphyotrichum ciliolatum* and *Solidago* species also may increase. *Ranunculus fascicularis* is much more frequent on some alvars subject to grazing than on adjacent non-grazed sites. Nevertheless, even light grazing tends to result in elimination of certain species, such as the disjunct *Orobanche fasciculata* (Catling and Brownell 1995). Several exotic species are invasive in alvar communities, including *Cynanchum rossicum, Echium vulgare, Hypericum perforatum, Lonicera morrowii, Lonicera tatarica*, and *Rhamnus cathartica*. *Poa compressa*, which is considered by most experts to be an introduced species, is also well-established on many alvar sites. These exotic species compete with native species for space and nutrients and, in some cases, become dominant (Reschke et al. 1998).

Dynamics of calcareous outcrops needs investigation.

ENVIRONMENT

Environmental Description: Alvars are maintained by associated geologic, hydrologic, and other landscape processes. In particular, most types of alvar experience moderate to severe drought in summer months, and some tend to flood each spring depending on topographic position. Soils are often thin (up to 30 cm of soil). Four key ecological processes influence Great Lakes alvar communities: (1) hydrology and soil moisture regime, (2) fire regime and land-use history, (3) herbivory: browsing by deer and grazing by cattle, and (4) the invasion of exotic plant species.

Calcareous rocky outcrops are poorly described in the region. See Lee et al. (1998) for information in southern Ontario, and state Natural Heritage Program classifications and Weatherbee (1996) in New England.

DISTRIBUTION

\*Geographic Range: Open shrub, scrub and herb calcareous rocky vegetation is found in isolated patches in the Laurentian-Acadian region of southeastern Canada and the northeastern United States, from Minnesota and southeastern Manitoba to Maine and Nova Scotia. Distribution in Lower New England states is uncertain.

Nations: CA, US

States/Provinces: CT?, MA?, MB, ME, MI, MN, NH, NS, NY, ON, PE?, QC, VT, WI

USFS Ecoregions (2007) [optional]: 211Ee:CCC, 212Hl:CCC, 212Rc:CCC, 212Re:CCC, 212Tb:CCC, 212Te:CCC, 222Ie:CCC, 222U:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G061 | Great Lakes Alvar |
| G767 | Northern Plains-Boreal Transition Alvar |
| G681 | Northern Alkaline Rocky Outcrop |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-07-24 | M163 Eastern North American Prairie & Barrens Macrogroup | M163 split into M505, M506, M507, M508, M509 |
| 2012-07-24 | M124 Northern & Central Alvar & Glade Macrogroup | M124 split into M507, M508, M509 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D. Faber-Langendoen, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.2.Nf. Western North American Grassland & Shrubland

D022. Western North American Grassland & Shrubland

Type Concept Sentence: This division contains cool-temperate lowland to subalpine shrubland, grassland, and meadow communities that are dominated by cold-deciduous shrubs or cool-season bunchgrasses or mesic forbs in the mountainous regions of western North America, from Alaska's Aleutian Islands south to the central coast of California, and down through the Intermountain West ranges and Rocky Mountains to Arizona and New Mexico.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.2.Nf. Temperate Grassland & Shrubland (F012)

Elcode: D022

\*Scientific Name: *Acer glabrum / Danthonia intermedia - Thalictrum occidentale* Western North American Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Rocky Mountain Maple / Timber Oatgrass - Western Meadowrue Western North American Grassland & Shrubland Division

\*Colloquial Name: Western North American Grassland & Shrubland

\*Type Concept: This division is a mix of cool-temperate lowland and montane shrubland and grassland communities that are dominated by cold-deciduous shrubs and cool-season (C3) grasses, mesic forbs, and occasionally evergreen shrubs. It is widely distributed in the mountainous regions of the western US extending from Alaska's Aleutian Islands and Canada south to the lee side of the central coast of California, and down through the Intermountain West ranges and Rocky Mountain cordillera to Arizona and New Mexico. These are moist-mesic montane shrublands of interior cool slopes and canyons from 300 to 1650 m in elevation. They can form high cover and extensive stands of mostly tall deciduous shrubs. Strong diagnostic species that are often dominant or codominant include *Acer glabrum, Amelanchier utahensis, Ribes cereum*, and *Symphoricarpos oreophilus*. Moderate diagnostics include *Holodiscus discolor, Holodiscus dumosus, Menziesia ferruginea, Physocarpus malvaceus, Physocarpus monogynus, Rosa nutkana, Rosa woodsii*, and *Vaccinium ovalifolium*. These species can also be common constituents of adjacent mesic forests and woodlands, or as successional elements following fire or logging. Drier sites may be dominated by a mix of deciduous and evergreen shrubs and dwarf-shrubs. At higher elevations (600-2011 m), *Vaccinium myrtillus, Vaccinium scoparium*, and *Vaccinium membranaceum* are strong diagnostics with *Arctostaphylos uva-ursi* and *Juniperus communis* often prevalent. There are large swaths of dry-mesic shrublands at lower elevations (1500-2700 m) where the strong diagnostic dominants are *Amelanchier utahensis, Cercocarpus montanus, Quercus gambelii, Quercus x pauciloba, Purshia stansburiana, Purshia tridentata, Ribes cereum*, and *Robinia neomexicana*. In contrast, the division also includes moist-mesic lowland (<1000 m) shrublands along the northwest coast of the continent where *Alnus viridis ssp. fruticosa, Rubus spectabilis, Salix barclayi*, and *Vaccinium ovalifolium* are moderate regional diagnostic shrubs along with *Athyrium filix-femina, Heracleum maximum*, and *Veratrum viride*, or a variety of other moist-mesic herbaceous species.

Coastal and montane grasslands and mesic meadows of the division tend to lack a strong tall-shrub component under low-disturbance conditions. The mesic meadows are typified by high herbaceous cover and a rich complement of forbs and graminoids. Strong diagnostic forb species include *Erigeron speciosus, Osmorhiza occidentalis, Senecio hydrophiloides, Senecio serra, Senecio triangularis*, and *Thalictrum occidentale*. Mesic graminoids form a lesser component; common moderate diagnostic species include *Bromus carinatus, Bromus sitchensis, Carex hoodii, Carex microptera*, and *Festuca viridula*. Mesic meadow stands occur on moderate to steep slopes, glacio-fluvial flats, and valley bottoms at high elevations where snow cover persists relatively late in the season (>600 m to the north; <3350 m to the south). The soils are typically seasonally moist to saturated in the spring but, if so, will dry out later in the growing season. Many occurrences are small-patch in spatial character, and are often found in mosaics with woodlands, more dense shrublands, or just below alpine communities.

Drier sites are dominated by cool-season bunchgrasses with a suite of dry-mesic forbs found in the inter-grass spaces. *Danthonia intermedia* is a strong diagnostic species with a suite of moderately diagnostic species that are regional dominants, e.g., *Danthonia parryi, Festuca arizonica, Festuca campestris, Festuca idahoensis, Festuca thurberi, Muhlenbergia montana*, and *Pseudoroegneria spicata* in montane and subalpine grasslands of the Rocky Mountains and Intermountain West; *Festuca idahoensis ssp. roemeri* and *Danthonia californica* in the far-west mountains. Forbs are diverse and tolerant of relatively dry conditions and include moderate diagnostics such as *Erigeron simplex, Eriogonum umbellatum, Potentilla hippiana*, and *Solidago multiradiata*. The grasslands occur on flat to rolling plains, in inter-montane parks, and on dry sideslopes, especially with south and west aspects. Soils are mostly fine-textured grasslands soils (Mollisols), but some sites are shallower, rocky and windswept. Most sites range from 2200 to 3000 m but extend to lower elevation foothills and plains (to 300 m). In contrast, along the west coast, these communities are found on low-elevation terraces and ridgeline balds on the dry (east) side of the mountain ranges.

Mesic grasslands and meadows can be prone to invasion by non-native naturalized forage species creating ruderal communities. Typical dominants include *Anthoxanthum odoratum, Bromus inermis, Cynosurus echinatus, Dactylis glomerata, Holcus lanatus, Phleum pratense, Poa pratensis*, and numerous other non-native herbaceous species such as *Acroptilon repens, Cardaria draba, Carduus nutans, Centaurea* spp., *Cirsium arvense, Lepidium latifolium, Linum bienne*, and *Linaria* spp. There are relatively few non-native temperate upland shrublands, but *Cytisus scoparius, Genista* spp., *Cytisus striatus* (or *Cytisus scoparius*), and *Ulex europaeus* can form shrublands best in less xeric regions.

\*Diagnostic Characteristics: This division is a mix of cool-temperate lowland and montane shrubland and grassland communities, which are dominated by cold-deciduous shrubs and cool-season (C3) grasses, and occasionally evergreen shrubs. Among mesic shrublands, *Acer glabrum, Amelanchier utahensis, Ribes cereum*, and *Symphoricarpos oreophilus* are strong diagnostics. Dwarf-shrubs such as *Vaccinium myrtillus, Vaccinium scoparium*, and *Vaccinium membranaceum* are also diagnostic, particularly at higher elevations. There are dry-mesic shrublands of lower elevations where the strong diagnostic dominants are *Amelanchier utahensis, Cercocarpus montanus, Purshia stansburiana, Purshia tridentata, Quercus gambelii, Quercus x pauciloba, Ribes cereum*, and *Robinia neomexicana*. Grasslands occur on drier sites as well and are dominated by cool-season bunchgrasses and dry-mesic forbs. *Danthonia intermedia* is a strong diagnostic species with a suite of moderately diagnostic species that are regional dominants, e.g., *Danthonia parryi, Festuca campestris, Festuca idahoensis, Festuca arizonica, Festuca thurberi, Muhlenbergia montana*, and *Pseudoroegneria spicata* in montane and subalpine grasslands of the Rocky Mountains and Intermountain West; *Festuca idahoensis ssp. roemeri, Festuca viridula* and *Danthonia californica* in the far-west mountains. Among forbs, moderate diagnostic species include *Erigeron simplex, Eriogonum umbellatum, Potentilla hippiana*, and *Solidago multiradiata*. Mesic grasslands and meadows can be prone to invasion by non-native naturalized forage species; typical dominants include *Anthoxanthum odoratum, Bromus inermis, Cynosurus echinatus, Dactylis glomerata, Holcus lanatus, Phleum pratense*, and *Poa pratensis*.

\*Classification Comments: This is a heterogeneous division in need of further revision at the macrogroup level to create more uniform sets of growth forms, diagnostic species, and climatic gradients that apply across the entire division. Currently, the division ranges from sea level to subalpine; precipitation ranges from 20 cm (desert) to 250 cm (rainforest) and varies from winter dominant to summer dominant; environments include coastal bluffs, rolling plains, valleys, wetlands, hillslopes and mountain peaks; vegetation physiognomy includes evergreen and deciduous shrublands, shrub-steppes, grasslands, and non-graminoid herbaceous meadows (all growth forms except trees).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D327 | Californian Scrub & Grassland |  |
| D023 | Central North American Grassland & Shrubland |  |
| D025 | North American Boreal Grassland & Shrubland |  |
| D027 | Pacific North American Coastal Scrub & Herb Vegetation |  |
| D039 | North American Warm Desert Scrub & Grassland |  |
| D043 | Western North American Alpine Tundra |  |
| D052 | Western North American Temperate Cliff, Scree & Rock Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This division is a mix of cool-temperate lowland and montane shrubland and grassland communities that are dominated by cold-deciduous shrubs and cool-season (C3) grasses, mesic forbs, and occasionally evergreen shrubs. It includes evergreen and deciduous shrublands, shrub-steppes, grasslands, and non-graminoid herbaceous meadows (all growth forms except trees).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: There are moist-mesic montane shrublands that can form high-cover stands where the dominant strong diagnostic species are *Acer glabrum, Amelanchier utahensis, Ribes cereum*, and *Symphoricarpos oreophilus*. Moderate diagnostics include *Holodiscus discolor, Holodiscus dumosus, Menziesia ferruginea, Physocarpus malvaceus, Physocarpus monogynus, Rosa nutkana, Rosa woodsii*, and *Vaccinium ovalifolium*. Under the shrubs and in the inter-shrub spaces there may be a diverse assortment of mesic forbs and graminoids (e.g., *Arnica sororia, Delphinium bicolor, Heracleum maximum, Luzula glabrata, Chamerion angustifolium, Hydrophyllum fendleri*, which are moderate diagnostic species). Drier sites may be dominated by a mix of deciduous and evergreen shrubs and dwarf-shrubs. At higher elevations (600-2011 m), *Vaccinium myrtillus, Vaccinium scoparium*, and *Vaccinium membranaceum* are strong diagnostics with *Arctostaphylos uva-ursi* and *Juniperus communis* often prevalent. There are large swaths of dry-mesic shrublands at lower elevations (1500-2700 m) where the strong diagnostic dominants are *Amelanchier utahensis, Cercocarpus montanus, Purshia stansburiana, Purshia tridentata, Quercus gambelii, Quercus x pauciloba, Ribes cereum*, and *Robinia neomexicana*. In contrast, the division also includes moist-mesic lowland (<1000 m) shrublands along the northwest coast of the continent where *Alnus viridis ssp. fruticosa, Rubus spectabilis, Salix barclayi*, and *Vaccinium ovalifolium* are moderate regional diagnostic shrubs along with *Athyrium filix-femina, Heracleum maximum*, and *Veratrum viride*, or a variety of other moist-mesic herbaceous species. Mesic meadows are typified by high herbaceous cover; strong diagnostic forb species include *Erigeron speciosus, Osmorhiza occidentalis, Senecio hydrophiloides, Senecio serra, Senecio triangularis*, and *Thalictrum occidentale*. Mesic graminoids form a lesser component; common moderate diagnostic species include *Bromus carinatus, Bromus sitchensis, Carex hoodii*, and *Carex microptera*. Drier sites are dominated by cool-season bunchgrasses with a suite of dry-mesic forbs in found in the inter-grass spaces. *Danthonia intermedia* is a strong diagnostic species with a suite of moderately diagnostic species that are regional dominants, e.g., *Danthonia parryi, Festuca arizonica, Festuca campestris, Festuca idahoensis, Festuca thurberi, Muhlenbergia montana*, and *Pseudoroegneria spicata* in montane and subalpine grasslands of the Rocky Mountains and Intermountain West; *Festuca idahoensis ssp. roemeri (= Festuca roemeri), Festuca viridula*, and *Danthonia californica* in the far-west mountains. Forbs are diverse and tolerant of relatively dry conditions and include moderate diagnostics such as *Erigeron simplex, Eriogonum umbellatum, Potentilla hippiana*, and *Solidago multiradiata*; moderate diagnostics include *Valeriana sitchensis, Erigeron formosissimus*, and *Geum macrophyllum*. Mesic grasslands and meadows can be prone to invasion by non-native naturalized forage species creating ruderal communities. Typical dominants include *Anthoxanthum odoratum, Bromus inermis, Cynosurus echinatus, Dactylis glomerata, Holcus lanatus, Phleum pratense, Poa pratensis*, and numerous other non-native herbaceous species such as *Acroptilon repens, Cardaria draba, Carduus nutans, Centaurea* spp., *Cirsium arvense, Lepidium latifolium, Linum bienne*, and *Linaria* spp. There are relatively few non-native temperate upland shrublands, but *Cytisus scoparius, Genista* spp., *Cytisus striatus* (or *Cytisus scoparius*), and *Ulex europaeus* can form shrublands best in less xeric regions.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The species in the shrublands and mesic meadows can also be common constituents of adjacent mesic forests and woodlands, or as successional elements following fire or logging. The grasslands tend to have a fire regime with rapid fire return that slows or sets back shrub invasion and maintains a low or patchy shrub distribution. Fire frequency is presumed to be less than 20 years. Shrublands have a fire regime with a longer fire-return interval or fire-adapted shrubs such as *Physocarpus malvaceus, Cercocarpus montanus, Quercus gambelii* (clonal), and *Robinia neomexicana*. Mesic meadow stands are typically not affected by fire due to moist conditions and surrounding rocky terrain. Natural processes affecting stands include fluctuating summer snowbanks (drought sequences), snow avalanches, and rockfalls. Burrowing mammals in places will disrupt the soil and vegetation locally.

ENVIRONMENT

Environmental Description: Environments are highly variable and include coastal bluffs, rolling plains, valleys, wetlands, hillslopes and mountain peaks. Moist-mesic montane shrublands occur on interior cool slopes and canyons from 300 to 1650 m in elevation. Mesic meadow stands occur on moderate to steep slopes, glacio-fluvial flats, and valley bottoms at high elevations where snow cover persists relatively late in the season (>600 m to the north; <3350 m to the south). They can also occur on gentle slopes with ample early-season seepage. The soils are typically seasonally moist to saturated in the spring but, if so, will dry out later in the growing season. Many occurrences are small-patch in spatial character, and are often found in mosaics with woodlands, more dense shrublands, or just below alpine communities. The grasslands occur on flat to rolling plains, in inter-montane parks, and on dry sideslopes, especially with south and west aspects. Grassland soils are mostly fine-textured grasslands soils (Mollisols), but some sites are shallower, rocky and windswept. Most sites range from 2200 to 3000 m but extend to lower-elevation foothills and plains (to 300 m). In contrast, along the west coast, these communities are found on low-elevation terraces and ridgeline balds on the dry (east) side of the mountain ranges.

Precipitation ranges from 20 cm (desert) to 250 cm (rainforest) and varies from winter dominant (west) to summer dominant (south and east).

DISTRIBUTION

\*Geographic Range: This division is widely distributed in the mountainous regions of the western U.S. extending from Alaska's Aleutian Islands and Canada south to the lee side of the central coast of California, and down through the Intermountain West ranges and Rocky Mountain cordillera to Arizona and New Mexico.

Nations: CA, US

States/Provinces: AB, AK, AZ, BC, CA, CO, ID, MT, NE, NM, NV, OR, SD, UT, WA, WY

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M049 | Southern Rocky Mountain Montane Shrubland |
| M048 | Central Rocky Mountain Montane-Foothill Grassland & Shrubland |
| M168 | Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow |
| M050 | Southern Vancouverian Lowland Grassland & Shrubland |
| M172 | Northern Vancouverian Lowland-Montane Grassland & Shrubland |
| M493 | Western North American Ruderal Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Cold Temperate Grassland | Brown et al. 1998 | Their Rocky Mountain Montane Grassland and Oregon (Pacific Coastal) Grassland Biotic communities are included here. |
| >< | Cold Temperate Scrubland | Brown et al. 1998 | Their Great Basin Montane Scrub Biome Biotic Community are included here. |
| < | Mountain Mahogany - Oak Scrub | West and Young 2000 |  |
| < | meadows and parks | Peet 2000 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D.E. Brown, F. Reichenbacher, and S. E. Franson (1998)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: E.H. Muldavin

Acknowledgments [optional]: Marion Reid

Version Date: 13 Jan 2016

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2. Shrub & Herb Vegetation

2.B.2.Nf. Western North American Grassland & Shrubland

M049. Southern Rocky Mountain Montane Shrubland

Type Concept Sentence: This shrubland macrogroup is found in the foothills, canyon slopes and montane zone of mountains of the southern Rocky Mountains and Colorado Plateau and extends out onto outcrops and canyon slopes in the western and southern Great Plains. The vegetation is characterized by an open to dense shrub layer typically dominated by *Cercocarpus montanus, Purshia tridentata*, and/or *Quercus gambelii*, and several other characteristic shrubs.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nf. Western North American Grassland & Shrubland (D022)

Elcode: M049

\*Scientific Name: *Quercus gambelii - Cercocarpus montanus - Purshia* spp. Southern Rocky Mountain Montane Shrubland Macrogroup

\*Common (Translated Scientific) Name: Gambel Oak - Alderleaf Mountain-mahogany - Bitterbrush species Southern Rocky Mountain Montane Shrubland Macrogroup

\*Colloquial Name: Southern Rocky Mountain Montane Shrubland

\*Type Concept: This macrogroup is found in the foothills, canyon slopes and montane zone of mountains of the southern Rocky Mountains and Colorado Plateau, including the Uinta and Wasatch ranges and the Mogollon Rim and extends out onto outcrops and canyon slopes in the western and southern Great Plains. The vegetation is characterized by an open to dense tall or short, broad-leaved deciduous shrub canopy typically dominated by *Cercocarpus montanus, Purshia tridentata*, and/or *Quercus gambelii*, which occasionally reaches small tree size. Many other characteristic shrubs may be codominant such as *Amelanchier alnifolia, Amelanchier utahensis, Arctostaphylos patula, Artemisia tridentata, Ceanothus fendleri, Ptelea trifoliata, Prunus virginiana, Purshia stansburiana, Quercus x pauciloba, Rhus trilobata, Ribes cereum, Robinia neomexicana, Rosa* spp., *Symphoricarpos oreophilus*, and *Symphoricarpos rotundifolius*. The herbaceous layer is sparse to moderately dense and dominated by perennial graminoids. Many forb and fern species can occur, but none has much cover. Annual grasses and forbs are seasonally present. Stands occupy the lower slope positions of the foothill and lower montane zones. Elevations range from 1500 to 2700 m. Stands may occur on level to steep slopes, cliffs, escarpments, rimrock slopes, rocky outcrops, and scree slopes. Soils are typically poorly developed, rocky to very rocky, and well-drained. Fire typically plays an important role in shrublands in this macrogroup.

\*Diagnostic Characteristics: This Rocky Mountain macrogroup is characterized by an open to dense tall or short, broad-leaved deciduous shrub canopy. Common diagnostic and often dominant species are *Cercocarpus montanus, Purshia tridentata*, and/or *Quercus gambelii*, which occasionally reach small tree size. Many other characteristic shrubs are associated with this macrogroup and may be codominant, such as *Amelanchier alnifolia, Amelanchier utahensis, Arctostaphylos patula, Artemisia tridentata, Ceanothus fendleri, Ptelea trifoliata, Prunus virginiana, Purshia stansburiana, Quercus x pauciloba, Rhus trilobata, Ribes cereum, Robinia neomexicana, Rosa* spp., *Symphoricarpos oreophilus*, and *Symphoricarpos rotundifolius* which often form a mixed shrub canopy. The herbaceous layer is not consistent, having sparse to moderately dense cover and mostly composed of perennial graminoids. Characteristic species include *Achnatherum scribneri, Bouteloua curtipendula, Carex geyeri, Carex inops, Elymus lanceolatus, Festuca thurberi, Hesperostipa comata, Leymus ambiguus, Muhlenbergia montana, Poa fendleriana*, and *Pseudoroegneria spicata*.

\*Classification Comments: ~Intermountain Basins Curl-leaf Mountain-mahogany Woodland & Scrub Group (G249)$$ with *Cercocarpus ledifolius* dominant in the overstory could be moved from ~Intermountain Singleleaf Pinyon - Juniper Woodland Macrogroup (M026)$$ to this macrogroup (M049), as that group overlaps ecologically, floristically, and geographically with associations in this macrogroup (J. Evens pers. comm. 2014).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M026 | Intermountain Singleleaf Pinyon - Juniper Woodland |  |
| M094 | Cool Interior Chaparral |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The vegetation may occur as sparse to dense broad-leaved deciduous shrublands composed of short shrubs (1-2 m) or tall shrubs (2-5 m) that occasionally develop into small trees. Occurrences may be multi-layered, with some short shrubby species occurring in the understory of the dominant overstory species. They can range from dense thickets with little understory to relatively mesic mixed shrublands with a rich understory of shrubs, grasses and forbs. These shrubs often have a patchy distribution with grass growing in between. Scattered trees are occasionally present in stands.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This macrogroup is characterized by an open to dense tall or short, broad-leaved deciduous shrub canopy typically dominated by *Cercocarpus ledifolius, Cercocarpus montanus, Purshia tridentata*, and/or *Quercus gambelii*, which occasionally reach small tree size. It may form dense thickets with little understory or be relatively open with a rich understory of shrubs, grasses and forbs. Scattered trees are occasionally present and typically include species of *Pinus* or *Juniperus*. Other characteristic shrubs that may be codominant include *Amelanchier alnifolia, Amelanchier utahensis, Arctostaphylos patula, Artemisia tridentata, Ceanothus fendleri, Cercocarpus intricatus, Ptelea trifoliata, Prunus virginiana, Purshia stansburiana, Quercus x pauciloba, Rhus trilobata, Ribes cereum, Robinia neomexicana, Rosa* spp., *Symphoricarpos oreophilus*, and *Symphoricarpos rotundifolius*. The herbaceous layer is sparse to moderately dense, ranging from 1-40% cover. Perennial graminoids are the most abundant species, particularly *Achnatherum scribneri, Andropogon gerardii, Aristida* spp., *Bouteloua curtipendula, Bouteloua eriopoda, Bouteloua gracilis, Carex inops, Carex geyeri, Elymus arizonicus, Elymus lanceolatus, Eragrostis* spp., *Festuca* spp., *Hesperostipa comata, Hesperostipa neomexicana, Koeleria macrantha, Muhlenbergia montana*, and *Pseudoroegneria spicata*. Many forb and fern species can occur, but none has much cover. Commonly present forbs include *Achillea millefolium, Artemisia* spp., *Geranium* spp., *Maianthemum stellatum, Thalictrum fendleri*, and *Vicia americana*. Ferns include species of *Cheilanthes* and *Woodsia*. Annual grasses and forbs are seasonally present, and weedy annuals are often present where disturbed, at least seasonally.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Fire typically plays an important role in shrublands in this macrogroup. Depending on fire intensity and shrub species, burning causes die-back of the dominant shrub species in some areas, promoting stump sprouting of the dominant shrubs in other areas, and controlling the invasion of trees into the shrubland system. Natural fires typically result in a mosaic of dense shrub clusters and openings dominated by herbaceous species. In some instances, these associations may be seral to the adjacent *Pinus ponderosa, Pinus monophylla, Abies concolor*, and *Pseudotsuga menziesii* woodlands and forests. Ream (1964) noted that on many sites in Utah, Gambel oak may be successional and replaced by *Acer grandidentatum*.

ENVIRONMENT

Environmental Description: This macrogroup typically occupies the lower slope positions of the foothill and montane zones. Elevations range from 1500 to 3100 m. Stands may occur on level to steep slopes, cliffs, escarpments, rimrock slopes, rocky outcrops, and scree slopes. *Climate:* Climate is semi-arid and characterized by mostly hot, dry summers with mild to cold winters and annual precipitation of 25 to 70 cm. Precipitation mostly occurs as winter snows but may also consist of some late-summer or monsoonal rains. *Soil/substrate/hydrology:* Soils are typically poorly developed, rocky to very rocky, and well-drained. Soil texture is variable and includes sand, sandy loam, coarse gravels, loams, and clay loams. Parent materials include alluvium, colluvium, and residuum derived from igneous, metamorphic or sedimentary rocks such as granite, gneiss, limestone, quartz, monzonite, rhyolite, sandstone, schist, and shale.

DISTRIBUTION

\*Geographic Range: This macrogroup is found in the foothills, canyon slopes and montane zone of mountains of the southern Rocky Mountains and Colorado Plateau, including the Uinta and Wasatch ranges and the Mogollon Rim and on outcrops and canyon slopes in the western and southern Great Plains. It ranges from southern New Mexico, extending north into Wyoming, and west into the Intermountain West region, including interior California.

Nations: US

States/Provinces: AZ, CA, CO, NE?, NM, NV?, SD, UT, WY

USFS Ecoregions (2007) [optional]: 313A:CC, 313B:CC, 313C:C?, 313D:CC, 315A:CC, 315B:CC, 315H:CC, 321A:CC, 322A:CC, 331B:CC, 331F:CC, 331G:CC, 331H:CC, 331I:CC, 331J:CC, 331M:CC, 341A:CC, 341B:CC, 341C:CC, 341F:CC, 342A:CC, 342E:CC, 342F:CC, 342G:CC, 342J:CC, M313A:CC, M313B:CC, M331A:CP, M331B:CP, M331D:CC, M331E:CC, M331F:CC, M331G:CC, M331H:CC, M331I:CC, M331J:CC, M332G:??, M334A:??, M341A:CC, M341B:CC, M341C:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G277 | Southern Rocky Mountain Gambel Oak - Mixed Montane Shrubland |
| G276 | Southern Rocky Mountain Mountain-mahogany - Mixed Foothill Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Gambel Oak (413) | Shiflet 1994 |  |
| < | Littleleaf Mountain-Mahogany (417) | Shiflet 1994 |  |
| < | Montane Scrub Series | Dick-Peddie 1993 |  |
| < | Mountain Mahogany - Mixed Shrub Series | Dick-Peddie 1993 |  |
| >< | Sideoats Grama - Sumac - Juniper (735) | Shiflet 1994 |  |
| < | True Mountain-Mahogany (416) | Shiflet 1994 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and E.H. Muldavin

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by M.E. Hall.

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.2.Nf. Western North American Grassland & Shrubland

M048. Central Rocky Mountain Montane-Foothill Grassland & Shrubland

Type Concept Sentence: This macrogroup occurs in the foothills and mountains throughout the Central Rockies, from central and eastern Wyoming north and west into British Columbia and Alberta and is composed of shrub- and/or herbaceous-dominated stands forming shrublands, shrub-steppe, or grasslands. Characteristic shrubs include *Acer glabrum, Amelanchier alnifolia, Holodiscus discolor, Menziesia ferruginea, Physocarpus malvaceus, Symphoricarpos albus, Symphoricarpos occidentalis*, and species of *Prunus, Rhus, Ribes, Rosa, Rubus parviflorus, Spiraea*, and *Vaccinium*. The herbaceous layer is characterized by *Festuca idahoensis, Pseudoroegneria spicata*, and other cool-season graminoids.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nf. Western North American Grassland & Shrubland (D022)

Elcode: M048

\*Scientific Name: *Amelanchier alnifolia / Festuca idahoensis - Pseudoroegneria spicata* Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Saskatoon Serviceberry / Idaho Fescue - Bluebunch Wheatgrass Grassland & Shrubland Macrogroup

\*Colloquial Name: Central Rocky Mountain Montane-Foothill Grassland & Shrubland

\*Type Concept: This macrogroup occurs in the foothills and mountains throughout the Central Rockies and montane Intermountain West region, from central and eastern Wyoming north and west into British Columbia and Alberta. This includes the "island ranges" of central Montana, though it is not common west to the East Cascades. It is broadly defined structurally and is composed of shrub- and/or herbaceous-dominated stands forming shrublands (>25% cover), shrub-steppe (10-25% cover), or open grasslands (shrubs <10% cover). Characteristic shrubs between 1 and 3 m in height are *Acer glabrum, Amelanchier alnifolia, Holodiscus discolor, Menziesia ferruginea, Physocarpus malvaceus, Prunus emarginata, Prunus virginiana, Rhus glabra, Rhus trilobata, Ribes lacustre, Rosa nutkana, Rosa woodsii, Rubus parviflorus, Sambucus nigra ssp. cerulea, Spiraea* spp., and *Symphoricarpos albus*. Dwarf-shrubs (<0.3 m tall) composed of *Vaccinium cespitosum, Vaccinium myrtillus, Vaccinium scoparium*, and *Vaccinium membranaceum* may be also form the dominant and characteristic woody layer. Grasslands are dominated by *Festuca idahoensis* and *Pseudoroegneria spicata*, with *Festuca campestris* increasing northward in Alberta. Other characteristic herbaceous graminoids present include *Achnatherum scribneri, Achnatherum hymenoides, Carex geyeri, Carex filifolia, Carex petasata, Danthonia* spp., *Elymus lanceolatus, Festuca campestris, Hesperostipa comata, Koeleria macrantha, Leucopoa kingii, Leymus cinereus, Pascopyrum smithii*, and *Poa secunda*. Associated forbs are numerous and include species of *Arnica, Antennaria, Erigeron, Eriogonum, Gaillardia, Galium, Geum, Heuchera, Liatris, Lithospermum, Lupinus, Lomatium, Oxytropis, Penstemon, Phlox, Potentilla*, and *Solidago*. On dry, sites with low grazing pressure, *Selaginella densa* and lichens provide significant ground cover between clumps of grasses. Non-native grasses can also be abundant and include *Phleum pratense, Bromus inermis*, and *Poa pratensis*. The herbaceous layer of shrublands has similar species composition to many of the grasslands in this macrogroup, except for the mesic shrublands with typically more mesic species such as *Heracleum maximum, Luzula glabrata*, or some other species such as *Chamerion angustifolium* and *Xerophyllum tenax*. *Alnus* spp. may occur in avalanche slopes. Stands occur as extensive foothill and valley grasslands and shrublands below the lower treeline and extend up into the high montane zones. Climate is temperate with predominantly dry summers and cold winters. Annual precipitation is approximately 20-80 cm, and primarily occurs in the winter as snow or rain, with moisture increasing with elevation. These communities tend to occur on gentle to steep-gradient slopes. Sites are highly variable. Grasslands tend to occur on warmer, drier sites and drier micro-climates, especially at higher elevation. Shrublands and dwarf-shrublands often occur on cooler, more mesic sites than grasslands. These shrubland communities also develop near talus slopes as garlands, at the heads of dry drainages, toeslopes in the moist shrub-steppe and steppe zones, and as smaller patches on dry sites that are marginal for tree growth and that have typically also experienced fire. Some site may occupy avalanche areas. Parent materials include basalt colluvium, loess, lava and tuff, glacial outwash composed of fine silts and clays of moderate depth. Soils range from poorly developed, well-drained alluvial or colluvial sands with a high percentage of rock fragments to be moderately deep, silt loam or loam with few rock fragments (less than 15% by volume and no rock cover). This macrogroup also includes grasslands from eastern Washington and Oregon commonly known as Palouse Prairie, which is characterized by rolling topography composed of loess hills and plains over basalt plains.

\*Diagnostic Characteristics: This broadly defined macrogroup is characterized by a variety of species forming shrublands, shrub-steppe, or grasslands. Characteristic species include *Acer glabrum, Amelanchier alnifolia, Holodiscus discolor, Menziesia ferruginea, Physocarpus malvaceus, Philadelphus lewisii, Prunus emarginata, Prunus virginiana, Rhus glabra, Rhus trilobata, Ribes lacustre, Rosa nutkana, Rosa woodsii, Rubus parviflorus, Sambucus nigra ssp. cerulea, Spiraea betulifolia, Spiraea splendens*, and *Symphoricarpos albus*. *Artemisia tridentata ssp. vaseyana* and *Cercocarpus montanus* may also be present in the southern extent, but neither dominates. Evergreen dwarf-shrubs <0.5 m tall can also form the characteristic woody layer. Common species include *Mahonia repens, Vaccinium cespitosum, Vaccinium myrtillus, Vaccinium scoparium*, and *Vaccinium membranaceum*, occurring alone or in any combination. Grasslands, whose species are often shared with the shrubland types, are dominated by *Festuca idahoensis* and *Pseudoroegneria spicata*. Other characteristic graminoid species include *Achnatherum occidentale, Achnatherum richardsonii, Calamagrostis rubescens, Danthonia intermedia, Danthonia parryi, Elymus lanceolatus, Elymus trachycaulus, Festuca campestris, Hesperostipa comata, Koeleria macrantha, Leucopoa kingii, Leymus cinereus, Leymus innovatus, Pascopyrum smithii, Phleum alpinum, Poa secunda, Trisetum spicatum* and a variety of Carices, such as *Carex hoodii, Carex elynoides, Carex filifolia, Carex geyeri, Carex obtusata*, and *Carex scirpoidea*. *Chamerion angustifolium, Heracleum maximum, Luzula glabrata*, and *Xerophyllum tenax* are characteristic of some herbaceous layer in mesic shrubland. Associated forb species are diverse and may include *Achillea millefolium, Arnica sororia, Antennaria microphylla, Artemisia ludoviciana, Artemisia frigida, Balsamorhiza sagittata, Delphinium bicolor, Erigeron* spp., *Eriogonum* spp., *Gaillardia aristata, Galium boreale, Geum triflorum, Heuchera* spp., *Liatris punctata, Lithospermum ruderale, Lupinus argenteus, Lupinus sericeus, Lomatium macrocarpum, Opuntia fragilis, Oxytropis* spp., *Penstemon confertus, Penstemon eriantherus, Phlox alyssifolia, Phlox hoodii, Potentilla glandulosa, Potentilla gracilis*, and *Solidago missouriensis*.

\*Classification Comments: This macrogroup has been recently modified. Former Columbia Basin Foothill & Canyon Dry Grassland Group (G274) was archived and its contents moved to ~Intermountain Semi-Desert Grassland Group (G311)$$ in ~Great Basin-Intermountain Dry Shrubland & Grassland Macrogroup (M171)$$. Former Central Rocky Mountain Montane-Foothill Mesic Deciduous Shrubland Group (G275) was also archived and the *Celtis laevigata var. reticulata*- and *Crataegus douglasii*-dominated or -codominated associations were deemed to be mostly riparian and were moved to ~Western Montane-Subalpine Riparian & Seep Shrubland Group (G527)$$. The other associations were moved to ~Central Rocky Mountain-North Pacific High Montane Mesic Shrubland Group (G305)$$ in the same macrogroup. The draft alliances will need to be reviewed and possibly moved.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M168 | Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow |  |
| M171 | Great Basin-Intermountain Dry Shrubland & Grassland | is a similar western macrogroup that includes lower elevation, drier grasslands and shrublands. There is some species overlap in foothill zone. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This variable macrogroup is composed of shrub and/or herbaceous stands forming a shrubland, shrub-steppe, or grassland. Shrub layers are typically composed of broad-leaved, cold-deciduous species generally between 1 and 3 m in height. However, dwarf-shrubs <0.3m tall such as *Vaccinium* spp. can be also form the characteristic woody layer. Shrub density will vary with substrate, fire and grazing history, and moisture, but these are rarely dense "thickets." They are typically found in small patches within the lower montane zone of Douglas-fir or ponderosa pine woodlands, or in a mosaic with sage shrub-steppe or valley grasslands. Grasses and forbs are the herbaceous component and can be abundant to sparse. The herbaceous layer is dominated by cool-season bunchgrasses, generally less than 1 m in height, and often dense in cover. Forb diversity is typically high in both mesic and dry aspects of this macrogroup. Shrubs are more common on slightly more mesic or protected sites (north slopes, toeslopes, swales). A soil crust of lichens covers almost all open soil between clumps of grasses; *Cladonia* and *Peltigera* species are the most common lichens. Unvegetated mineral soil is commonly found between clumps of grass and the lichen cover.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This macrogroup is broadly defined and is composed of shrub- and/or herbaceous-dominated stands forming a shrubland, shrub-steppe, or grassland. If present, the shrub layer is typically composed of broad-leaved, cold-deciduous species generally between 1 and 3 m in height and dominated by one species or a mix of shrubs such as *Acer glabrum, Amelanchier alnifolia, Holodiscus discolor, Menziesia ferruginea, Physocarpus malvaceus, Prunus emarginata, Prunus virginiana, Rhus glabra, Rhus trilobata, Ribes lacustre, Rosa nutkana, Rosa woodsii, Rubus parviflorus, Sambucus nigra ssp. cerulea (= Sambucus caerulea), Spiraea betulifolia, Spiraea splendens*, and *Symphoricarpos albus*. Occurrences in central and eastern Wyoming can include *Artemisia tridentata ssp. vaseyana* and *Cercocarpus montanus*, but neither of these is dominant, and where they occur, the stands are truly mixes of shrubs. Evergreen low and dwarf-shrubs (<0.5 m tall) can also form the characteristic woody layer. Common species include *Mahonia repens, Vaccinium cespitosum, Vaccinium myrtillus, Vaccinium scoparium*, and *Vaccinium membranaceum*, occurring alone or in any combination. *Juniperus communis* shrublands are found at high elevations in the eastern Cascades and are tentatively included here. Other common woody plants include *Paxistima myrsinites, Sorbus scopulina*, and *Sorbus sitchensis*.

The herbaceous layer is variable, ranging from foothill to subalpine grasslands, as well as the understory of shrublands included in this macrogroup. The herbaceous layer of shrublands varies in cover depending on shrub density; the species composition is similar to many of the grasslands in this macrogroup, except for the mesic shrublands with typically more mesic species such as *Heracleum maximum, Luzula glabrata*, or some other species such as *Chamerion angustifolium* and *Xerophyllum tenax*.

Throughout much of the macrogroup, *Festuca idahoensis* and *Pseudoroegneria spicata* are the most important grasses and are usually present and often dominant. In the northern extent on moist sites with low grazing pressures, *Festuca campestris* can form a nearly continuous cover and is interspersed with *Festuca idahoensis* and the rhizomatous ecotype of *Pseudoroegneria spicata*. *Danthonia parryi* becomes codominant moving north into the Alberta foothills. Other graminoids include *Achnatherum occidentale, Achnatherum richardsonii, Elymus lanceolatus, Hesperostipa comata, Koeleria macrantha, Leymus cinereus, Pascopyrum smithii*, and *Poa secunda*. Moister sites support a forb-rich community that includes species such as *Achillea millefolium, Balsamorhiza sagittata, Castilleja* spp., *Delphinium bicolor, Fragaria virginiana, Gentiana affinis, Geranium viscosissimum, Lomatium triternatum, Lupinus sericeus, Oxytropis* spp., *Penstemon confertus, Potentilla glandulosa*, and *Potentilla gracilis*.

On drier sites *Festuca idahoensis* and the bunchgrass ecotype of *Pseudoroegneria spicata* dominate with forbs such as *Achillea millefolium, Arnica sororia, Antennaria microphylla, Artemisia ludoviciana, Artemisia frigida, Erigeron* spp., *Eriogonum* spp., *Gaillardia aristata, Galium boreale, Geum triflorum, Heuchera* spp., *Liatris punctata, Lithospermum ruderale, Lupinus argenteus, Lupinus sericeus, Lomatium macrocarpum, Penstemon eriantherus, Phlox alyssifolia, Phlox hoodii, Potentilla gracilis, Opuntia fragilis, Oxytropis* spp., *Pulsatilla patens*, and *Solidago missouriensis*. Other graminoids present within this drier community include *Achnatherum scribneri, Achnatherum hymenoides, Carex geyeri, Carex filifolia, Carex petasata, Danthonia intermedia, Koeleria macrantha*, and *Poa secunda*. On dry sites with low grazing pressures, *Selaginella densa* and a soil crust of lichens cover almost all open soil between clumps of grasses. *Cladonia* and *Peltigera* spp. are the most common lichens present. Important introduced grasses include *Phleum pratense, Bromus inermis*, and *Poa pratensis*.

Higher elevation montane grasslands are also typically dominated by *Festuca idahoensis* and *Pseudoroegneria spicata*. Other typical include species include *Achnatherum occidentale, Achnatherum richardsonii, Calamagrostis rubescens, Danthonia intermedia, Elymus trachycaulus, Leucopoa kingii, Leymus innovatus (= Elymus innovatus), Phleum alpinum, Trisetum spicatum*, a variety of Carices, such as *Carex hoodii, Carex elynoides, Carex filifolia, Carex geyeri, Carex obtusata*, and *Carex scirpoidea*. Important forbs are *Eriogonum* spp., *Fragaria virginiana, Geranium viscosissimum, Lupinus argenteus var. laxiflorus, Lupinus sericeus, Oxytropis campestris, Phlox pulvinata, Potentilla diversifolia*, and *Potentilla flabellifolia*.

Shrub species may be scattered or patchy, including *Arctostaphylos uva-ursi, Artemisia tridentata, Dasiphora fruticosa ssp. floribunda, Juniperus communis, Rosa arkansana, Rosa nutkana, Rosa woodsii, Symphoricarpos* spp., and in Wyoming *Artemisia tripartita ssp. rupicola*. Several species of *Eriogonum* are also common. *Amelanchier alnifolia, Crataegus douglasii*, and *Prunus virginiana* often occur as patches on north-facing slopes of foothills where snow persists longer into the growing season. *Salix bebbiana* copses form a unique shrubland area in Alberta. *Alnus* spp. may occur on avalanche slopes.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The natural fire regime of this macrogroup is variable. The grasslands tend to have a fire regime with rapid fire return that slows or sets back shrub invasion and maintains a low or patchy shrub distribution. Fire frequency is presumed to be less than 20 years. These are extensive grasslands, though they are similar to grass-dominated patches within the sagebrush shrublands of ~Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland Macrogroup (M169)$$. Shrubs, and even trees, including *Pinus ponderosa* and *Pseudotsuga menziesii*, may increase following heavy grazing and/or with fire suppression. Shrublands included in this macrogroup have a fire regime with a longer fire-return interval or fire-adapted shrubs such as *Physocarpus malvaceus* that vigorously sprout after burning and may competitively exclude *Pseudotsuga menziesii* seedlings (Johnson and Simon 1987).

On grassy sites, summer overgrazing for two to three years can result in the loss of *Festuca campestris*, which is very grazing-sensitive. Long-term heavy grazing on moister sites can result in a shift to a *Poa pratensis - Phleum pratense* type. *Pseudoroegneria spicata* shows an inconsistent reaction to grazing, increasing on some grazed sites while decreasing on others. It seems to recover more quickly from overgrazing than *Festuca campestris*, tolerates dormant-period grazing well but is sensitive to defoliation during the growing season. Reaction of *Festuca idahoensis* to grazing needs to be documented. Light spring use or fall grazing can help retain plant vigor. Exotic species threatening this macrogroup through invasion and potential complete replacement of native species include *Bromus arvensis, Euphorbia esula, Phleum pratense, Potentilla recta*, and all manner of knapweed, especially *Centaurea stoebe ssp. micranthos*. In the Palouse Prairie, excessive grazing, past land use and invasion by introduced annual species have resulted in a massive conversion to agriculture or shrub-steppe and annual grasslands dominated by *Artemisia* spp. and *Bromus tectorum* or *Poa pratensis*. Remnant grasslands are now typically associated with steep and rocky sites or small and isolated sites within an agricultural landscape.

ENVIRONMENT

Environmental Description: The grasslands, shrub-steppe, shrubland and dwarf-shrublands included in this macrogroup are found in the central Rocky Mountains and Intermountain West regions. They have a broad elevational range and occur as extensive foothill and valley grasslands and shrublands below the lower treeline and on drier sites, particularly south-facing slopes or ridgetops. They are also found at montane elevations along the mountain flanks and large intermountain valleys up into the subalpine zone to near upper treeline, ranging from small meadows to large open parks surrounded by conifers. Depending on latitude, the lower elevation stands occur from 300 to 1650 m (990-5410 feet) and the upper montane to subalpine grassland and shrubland range from 600 to 2011 m (2000-7500 feet) in northern Montana and southwestern Alberta, and up to 2286 to 2682 m (7500-8800 feet) in the mountains of southwestern Montana and Wyoming. These communities occur on gentle to steep-gradient slopes. Sites are highly variable. Grasslands tend to occur on warmer, drier sites, especially at higher elevation. Shrublands and dwarf-shrublands often occur on cooler, more mesic sites than grasslands. The high-elevation stands typically have plentiful snow, along with wind desiccation, in the subalpine-alpine transition. Fire, flooding and erosion all impact the shrubland communities, but they typically will persist on sites for long periods. Avalanches slopes may also occur. These shrubland communities also develop near talus slopes as garlands, at the heads of dry drainages, toeslopes in the moist shrub-steppe and steppe zones, and as smaller patches on dry sites that are marginal for tree growth and that have typically also experienced fire. This macrogroup also includes grasslands from eastern Washington and Oregon commonly known as Palouse Prairie, which is characterized by rolling topography composed of loess hills and plains over basalt plains.

*Climate:* This vegetation reflects a shift in the precipitation regime from summer rain and cold snowy winters found in the Southern Rockies to predominantly dry summers and winter precipitation found in the Central Rockies. Summers are short and winters are cold. Annual precipitation is approximately 20-800 cm, and primarily occurs in the winter as snow or rain. Moisture is stored in the soil and utilized during the dry summers. In the eastern portion of its range in Montana, winter precipitation is replaced by a huge spring peak in precipitation. In the Palouse region the climate has warm-hot, dry summers and cool, wet winters. Annual precipitation is high, 38-76 cm (15-30 inches).

*Soil/substrate/hydrology:* Parent materials include basalt colluvium, loess, lava and tuff, glacial outwash or till, composed of fine silts and clays of moderate depth. Soils are poorly developed, well-drained alluvial or colluvial sands that often have a high percentage of rock fragments; or they may be moderately deep, silt loam or loam with few rock fragments (less than 15% by volume and no rock cover). Some of these sites are occasionally scoured by flash floods or high runoff events. The Palouse Prairie region is characterized by rolling topography composed of loess hills and plains over basalt plains. The soils are typically deep, well-developed, and old. Outside of the Palouse Prairie region, these grasslands occur on young soils derived from recent glacial and alluvial material. Soils are relatively deep, fine-textured, often with coarse fragments, and non-saline, often with a microphytic crust.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs in the foothills and mountains throughout the Central Rockies and montane Intermountain West regions, from central and eastern Wyoming north and west into British Columbia and Alberta. This includes the "island ranges" of central Montana, though it is not common. It also occurs in the East Cascades, but how far south into the Sierra Nevada is as yet unclear.

Nations: CA, US

States/Provinces: AB, BC, CA, CO, ID, MT, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]: 331A:CC, 331D:CC, 331N:CC, 341G:CC, 342A:CC, 342B:CC, 342C:CC, 342D:CC, 342E:CC, 342F:CP, 342H:CC, 342I:CC, 342J:CC, M242B:CC, M242C:CC, M242D:CC, M261D:PP, M261G:P?, M331A:CC, M331B:CC, M331D:CC, M331E:CP, M331J:CC, M332A:CC, M332B:CC, M332D:CC, M332E:CC, M332F:CC, M332G:CC, M333A:CC, M333B:CC, M333C:CC, M333D:CC, M334A:CC, M341A:PP

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]: See Classification Comments section above. This macrogroup has had recent edits and may need to be revisited along with the other northern Rocky Mountain temperate shrublands (M168).

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G267 | Central Rocky Mountain Montane Grassland |
| G272 | Central Rocky Mountain Montane-Foothill Deciduous Shrubland |
| G273 | Central Rocky Mountain Lower Montane, Foothill & Valley Grassland |
| G305 | Central Rocky Mountain-North Pacific High Montane Mesic Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Bittercherry (419) | Shiflet 1994 |  |
| >< | Bluebunch Wheatgrass (101) | Shiflet 1994 |  |
| < | Bluebunch Wheatgrass - Blue Grama (301) | Shiflet 1994 | Several SRM range types of northern Rocky Mountains correspond to this group. |
| < | Bluebunch Wheatgrass - Sandberg Bluegrass (302) | Shiflet 1994 | Several SRM range types of northern Rocky Mountains correspond to this group. |
| < | Bluebunch Wheatgrass - Western Wheatgrass (303) | Shiflet 1994 | Several SRM range types of northern Rocky Mountains correspond to this group. |
| >< | Chokecherry - Serviceberry - Rose (421) | Shiflet 1994 |  |
| >< | Fescue Grassland (613) | Shiflet 1994 | Festuca campestris grasslands are important components of this group. |
| >< | Idaho Fescue (102) | Shiflet 1994 |  |
| > | Idaho Fescue - Bluebunch Wheatgrass (304) | Shiflet 1994 |  |
| >< | Idaho Fescue - Richardson Needlegrass (305) | Shiflet 1994 | This SRM type is described as occurring at "medium to high elevations", which suggests it primarily crosswalks to this group. |
| < | Idaho Fescue - Slender Wheatgrass (306) | Shiflet 1994 |  |
| < | Idaho Fescue - Threadleaf Sedge (307) | Shiflet 1994 |  |
| < | Idaho Fescue - Tufted Hairgrass (308) | Shiflet 1994 |  |
| < | Idaho Fescue - Western Wheatgrass (309) | Shiflet 1994 |  |
| > | MS Montane Shrub/Grassland Dry Subdivision sites | Ecosystems Working Group 1998 |  |
| < | Needle-and-thread - Blue Grama (310) | Shiflet 1994 |  |
| < | Rough Fescue - Bluebunch Wheatgrass (311) | Shiflet 1994 |  |
| >< | Rough Fescue - Idaho Fescue (312) | Shiflet 1994 |  |
| >< | Shrubby Cinquefoil - Rough Fescue (323) | Shiflet 1994 |  |
| >< | Tufted Hairgrass - Sedge (313) | Shiflet 1994 | Drier portions of this SRM type overlap with this group. |
| >< | no data (BGxh3/01) | Steen and Coupé 1997 |  |
| >< | no data (BGxw2/01) | Steen and Coupé 1997 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: K.A. Schulz, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and M.S. Reid

Acknowledgments [optional]: Todd Keeler-Wolf and Julie Evens for review of draft macrogroup.

Version Date: 29 Mar 2017

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2. Shrub & Herb Vegetation

2.B.2.Nf. Western North American Grassland & Shrubland

M168. Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

Type Concept Sentence: This macrogroup includes montane and subalpine mesic meadows from the Rocky Mountains west to the Sierra Nevada and eastern Cascades, and drier grasslands from the southern Rocky Mountains west in the high plateaus and ranges. Vegetation is composed of low (<1 m) open to dense perennial graminoid layer. Characteristic grassland species include *Danthonia intermedia, Danthonia parryi, Festuca arizonica, Festuca thurberi*, and *Muhlenbergia montana* in montane and subalpine grasslands in the southern Rocky Mountains. Dominant mesic meadow species include *Achillea millefolium, Carex spectabilis, Chamerion angustifolium, Erigeron speciosus, Lupinus latifolius, Senecio hydrophiloides, Senecio serra, Solidago canadensis, Symphyotrichum* spp., *Thalictrum occidentale*, and *Zigadenus elegans*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nf. Western North American Grassland & Shrubland (D022)

Elcode: M168

\*Scientific Name: *Deschampsia cespitosa - Ligusticum* spp. - *Muhlenbergia montana* Subalpine-High Montane Mesic Meadow Macrogroup

\*Common (Translated Scientific) Name: Tufted Hairgrass - Licorice-root species - Mountain Muhly Subalpine-High Montane Mesic Meadow Macrogroup

\*Colloquial Name: Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

\*Type Concept: This herbaceous macrogroup is widespread in the Rocky Mountains cordillera from New Mexico and Colorado north into Canada, and west to high plateaus and mountains in the Colorado Plateau, higher mountain ranges of Nevada, and the Sierra Nevada into the eastern Cascades. It also occurs in the "island ranges" of central Montana. Vegetation is composed of an open to dense perennial graminoid layer that is generally less than 1 m tall. Characteristic grassland species include *Danthonia parryi, Danthonia intermedia, Festuca arizonica, Festuca thurberi*, and *Muhlenbergia montana* in montane and subalpine grasslands in the southern Rocky Mountains. Associated graminoid species include *Blepharoneuron tricholepis, Bouteloua gracilis, Festuca idahoensis, Hesperostipa comata, Muhlenbergia filiculmis*, and *Pseudoroegneria spicata*. Forb associates may be diverse and composed of relatively dry forbs such as *Castilleja* spp., *Erigeron simplex, Eriogonum umbellatum, Hymenoxys richardsonii, Penstemon secundiflorus, Potentilla hippiana*, and *Solidago multiradiata*. Mesic meadows are typically composed of a wide diversity of genera and contribute more to overall herbaceous cover than graminoids. Important forbs include *Achillea millefolium, Allium schoenoprasum, Angelica* spp., *Athyrium filix-femina, Camassia quamash, Campanula rotundifolia, Chamerion angustifolium, Erigeron speciosus, Eucephalus* spp., *Geum macrophyllum, Hackelia* spp., *Heracleum maximum, Ligusticum* spp., *Lupinus latifolius, Mertensia* spp., *Osmorhiza occidentalis, Pteridium aquilinum, Senecio hydrophiloides, Senecio serra, Senecio triangularis, Solidago canadensis, Symphyotrichum* spp., *Thalictrum occidentale, Valeriana* spp., *Veratrum viride*, and *Zigadenus elegans*. Forb diversity can be quite high and intergrades with grasses in adjacent grassland stands. At montane elevations, graminoids form a minor component and are usually taxa with relatively broad and soft blades such as *Bromus carinatus, Bromus sitchensis, Carex hoodii, Carex microptera, Carex raynoldsii, Deschampsia cespitosa*, and *Elymus glaucus*. Broadleaf deciduous shrubs such as *Dasiphora fruticosa ssp. floribunda* and *Symphoricarpos* spp. are often present, but do not dominate. Other locally abundant forbs include *Hydrophyllum fendleri, Phacelia hastata, Phlox diffusa, Saussurea americana*, and *Xerophyllum tenax*. Burrowing mammals can increase the forb diversity. Stands occupy a wide variety of environments where finely-textured soils, snow deposition, rocky substrates, or windswept dry conditions limit tree establishment. The grasslands occur on flat to rolling plains, in inter-montane parks and on dry sideslopes, especially with south and west aspects. Mesic meadow stands occur in swales that lose their snow cover relatively late in the season. Southern Rocky Mountain stands range from 2200 to 3000 m elevation extending up to 3350 m on warm aspects. Central Rocky Mountain stands typically occur above 2000 m in elevation in the southern extent and above 600 m in the north. These upland communities occur on gentle to moderate-gradient slopes and relatively moist habitats. At montane elevations, this macrogroup occurs within *Pinus-Pseudotsuga* or mixed conifer-dominated forests. At subalpine elevations, these meadows are found below treeline, usually within *Abies lasiocarpa-Picea*-dominated forests.

\*Diagnostic Characteristics: This herbaceous macrogroup typically occurs where finely-textured soils, snow deposition, snow avalanches, or windswept dry conditions limit tree establishment. Vegetation is composed of an open to dense perennial graminoid layer that is generally less than 1 m tall. Characteristic grassland species include *Danthonia parryi, Festuca arizonica*, and *Muhlenbergia montana* in montane grasslands and *Danthonia intermedia* and *Festuca thurberi* in subalpine grasslands in the southern Rocky Mountains. Dominant mesic meadow species include *Achillea millefolium, Carex spectabilis, Chamerion angustifolium, Erigeron speciosus, Lupinus latifolius, Senecio hydrophiloides, Senecio serra, Senecio triangularis, Solidago canadensis, Symphyotrichum* spp., *Thalictrum occidentale*, and *Zigadenus elegans*, although forb diversity can be quite high. Associated graminoid species include *Blepharoneuron tricholepis, Bouteloua gracilis, Festuca idahoensis, Hesperostipa comata, Muhlenbergia filiculmis*, and *Pseudoroegneria spicata*. Forb communities found on talus and scree slopes with subsurface moisture are included here, in particular when they are not sparsely vegetated.

\*Classification Comments: This macrogroup contains three groups: two montane mesic meadow groups that include all montane mesic meadows from the Rocky Mountains west to the Sierra Nevada, and the drier-site montane grasslands from the southern Rocky Mountains. Other montane grasslands from the central Rocky Mountains are included in ~Central Rocky Mountain Montane-Foothill Grassland & Shrubland Macrogroup (M048)$$. Due to the different environmental setting, few diagnostic species are shared at the macrogroup level. However, *Festuca idahoensis* and *Pseudoroegneria spicata* are included in this description, and they also define M048. Also see *Achillea millefolium, Danthonia intermedia, Lupinus, Solidago, Chamerion angustifolium*, etc. This suggests a certain overlap between M048 and M168.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M172 | Northern Vancouverian Lowland-Montane Grassland & Shrubland |  |
| M048 | Central Rocky Mountain Montane-Foothill Grassland & Shrubland | contains similar montane mesic meadow and drier montane grasslands. |

Similar NVC Types General Comments [optional]: While there is overlap in herbaceous floristics and ecological parameters between this macrogroup (M168) and ~Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland Macrogroup (M075)$$, types in M168 occur in wetter meadows.

VEGETATION

Physiognomy and Structure Summary: This macrogroup includes herbaceous communities dominated by flowering forbs, often tall (but still usually <1 m in height) and/or an open to dense perennial graminoid layer also less than 1 m tall. Cover is generally dense or can be patchy.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Vegetation in this herbaceous macrogroup typically occurs where local conditions limit tree establishment. It is composed of an open to dense perennial graminoid layer that is generally less than 1 m tall. Characteristic grassland species include *Danthonia parryi, Festuca arizonica*, and *Muhlenbergia montana* in montane grasslands and *Danthonia intermedia* and *Festuca thurberi* in subalpine grasslands in the southern Rocky Mountains. Associated graminoid species include *Blepharoneuron tricholepis, Bouteloua gracilis, Festuca idahoensis, Hesperostipa comata, Muhlenbergia filiculmis*, and *Pseudoroegneria spicata*. Forb components in grasslands include drier-site species such as *Castilleja* spp., *Erigeron simplex, Erigeron ursinus, Eriogonum umbellatum, Hymenoxys richardsonii, Penstemon secundiflorus, Potentilla hippiana, Solidago multiradiata*, and *Symphyotrichum foliaceum (= Aster foliaceus)* which may be present to codominant. In disturbed stands, species such as *Heterotheca villosa* may codominate. Tall forb-dominated mesic meadows are typically composed of a wide diversity of genera and contribute more to overall herbaceous cover than graminoids. At montane elevations, important forbs include *Achillea millefolium, Allium schoenoprasum, Angelica arguta, Arnica chamissonis, Athyrium filix-femina, Camassia quamash, Campanula rotundifolia, Chamerion angustifolium, Erigeron speciosus, Eucephalus* spp., *Geum macrophyllum, Hackelia* spp., *Heracleum maximum, Lupinus latifolius, Mertensia* spp., *Osmorhiza occidentalis, Pteridium aquilinum, Senecio hydrophiloides, Senecio serra, Solidago canadensis, Symphyotrichum* spp., *Thalictrum occidentale*, and *Zigadenus elegans*. Forb diversity can be quite high and intergrades with grasses in adjacent grassland stands. At montane elevations, graminoids form a minor component and are usually taxa with relatively broad and soft blades such as *Bromus carinatus, Bromus sitchensis, Carex hoodii, Carex microptera, Carex raynoldsii, Deschampsia cespitosa, Elymus glaucus*, and *Melica spectabilis*. Broadleaf deciduous shrubs such as *Dasiphora fruticosa ssp. floribunda* and *Symphoricarpos* spp. are occasional but not abundant. At subalpine and low alpine elevations, *Angelica* spp., *Arnica latifolia, Castilleja miniata, Erigeron peregrinus, Erythronium grandiflorum, Ligusticum* spp., *Senecio triangularis, Valeriana* spp., and *Veratrum viride* are commonly the dominant forbs. Other locally abundant forbs include *Hydrophyllum fendleri, Phacelia hastata, Phlox diffusa, Saussurea americana*, and *Xerophyllum tenax*. Burrowing mammals can increase the forb diversity. Early-successional stages may be dominated by *Achillea millefolium, Agastache urticifolia, Chamerion angustifolium, Urtica dioica*, and other forbs, and low cover of mesic grasses such as *Bromus carinatus* and *Deschampsia cespitosa*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: This macrogroup is found in areas that inhibit the establishment of woody species, including areas with finely-textured soils, snow deposition, and/or windswept dry conditions. Mesic meadow stands are typically not affected by fire due to moist conditions and surrounding rocky terrain. Natural processes affecting stands include fluctuating summer snowbanks (drought sequences), snow avalanches, and rockfalls. Burrowing mammals in places will disrupt the soil and vegetation locally.

ENVIRONMENT

Environmental Description: This macrogroup includes montane and subalpine mesic meadows from the Rocky Mountains west to the Sierra Nevada and eastern Cascade Range, and drier grasslands from the southern Rocky Mountains west in the high plateaus and ranges. Southern Rocky Mountain stands range from 2200 and 3000 m elevation extending up to 3350 m on warm aspects. Central Rocky Mountain stands typically occur above 2000 m in elevation in the southern extent and above 600 m in the north. Stands occupy a wide variety of environments where finely-textured soils, snow deposition, rocky substrates, or windswept dry conditions limit tree establishment. The grasslands occur on flat to rolling plains, in inter-montane parks and on dry sideslopes, especially with south and west aspects. They can also occur on gentle slopes with ample early-season seepage. Mesic meadow stands occur in swales that lose their snow cover relatively late in the season. Many occurrences are small-patch in spatial character, and are often found in mosaics with woodlands, more dense shrublands, or just below alpine communities. These upland communities occur on gentle to moderate-gradient slopes and relatively moist habitats. At montane elevations, this macrogroup occurs within *Pinus-Pseudotsuga* or mixed conifer-dominated forests. At subalpine and low alpine elevations, these meadows are found below treeline, usually within *Abies lasiocarpa-Picea*-dominated forests, or extend into the low alpine.

*Climate:* Approximately two-thirds of the region's precipitation occurs in just half the year (October to March), with the remaining third occurring in late spring to early summer. Generally, the east slopes of the Cascades east to the northern Rocky Mountains of Montana and Wyoming receive greater than 100 cm of precipitation annually. *Soil/substrate/hydrology:* Grassland soils are relatively high in organic matter, slightly acidic, and usually well-drained. Mesic meadow soils are typically seasonally moist to saturated during spring and early summer after snowmelt, but will dry out later in the growing season. Some occur on banks of high-gradient ephemeral streams that accumulate deep snowpacks, saturated rocky areas at the base of summer snowbanks, and seasonally saturated rocky areas. At montane elevations, soils are usually clays or silt loams with an A-horizon greater than 10 cm. Some sites may have inclusions of hydric soils in low, depressional areas within this macrogroup. At subalpine elevations, soils are derived from a variety of parent materials, and can be acidic or calcareous. The A-horizon is typically less than 10 cm, and soils are usually rocky or gravelly with good aeration and drainage, but with a well-developed organic layer. A third setting includes talus or scree slopes, or colluvial fields of rocks and small boulders, where subsurface moisture is provided by melting snow throughout much of the growing season. These rocky areas have soils composed of varied parent materials and are usually young and poorly developed.

DISTRIBUTION

\*Geographic Range: This macrogroup is widespread in the Rocky Mountains cordillera from New Mexico and Colorado north into Alberta and British Columbia, and west to high plateaus and mountains in the Colorado Plateau, higher mountain ranges of Nevada, Sierra Nevada into the eastern Cascades. It also occurs in the "island ranges" of central Montana.

Nations: CA, US

States/Provinces: AB, AZ, BC, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]: 313A:CC, 313B:CC, 313C:CP, 313D:CP, 315A:CC, 315H:CP, 321A:PP, 322A:??, 331B:CC, 331G:CC, 331H:CC, 331I:CC, 331J:CC, 341A:CC, 341B:CC, 341C:CC, 341E:CP, 341F:CP, 341G:CC, 342A:CC, 342B:CP, 342C:CC, 342D:CC, 342E:CC, 342F:CC, 342G:CC, 342H:CC, 342J:CC, M313A:CC, M313B:CC, M331A:CC, M331B:CC, M331D:CC, M331E:CC, M331F:CC, M331G:CC, M331H:CC, M331I:CC, M331J:CC, M332A:CC, M332B:CC, M332D:CC, M332E:CC, M332F:CC, M332G:CC, M333A:CC, M333B:CC, M333C:CC, M333D:CC, M334A:??, M341A:CC, M341B:CC, M341C:CC, M341D:CP

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: As a macrogroup it combines two mesic meadow groups and one drier montane grassland from the southern Rocky Mountains. Grasslands are in separate group for it's more a question of clarifying exactly how it relates to drier predominantly grass-dominated groups, and also the relationship of specific associations to wet meadow groups.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G268 | Southern Rocky Mountain Montane-Subalpine Grassland |
| G271 | Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Idaho Fescue - Tufted Hairgrass (308) | Shiflet 1994 |  |
| = | Rocky Mountain Alpine and Subalpine Grassland, Bunchgrass Series - 141.41 | Brown et al. 1979 |  |
| < | Rocky Mountain Alpine and Subalpine Grassland, Bunchgrass Series, *Festuca arizonica* Association - 141.412 | Brown et al. 1979 |  |
| < | Rocky Mountain Alpine and Subalpine Grassland, Bunchgrass Series, *Festuca thurberi* Association - 141.411 | Brown et al. 1979 |  |
| < | Rocky Mountain Alpine and Subalpine Grassland, Bunchgrass Series, Mixed Grass-Forb Association - 141.413 | Brown et al. 1979 |  |
| = | Rocky Mountain Montane Grassland, Mixed Meadow Series - 142.41 | Brown et al. 1979 |  |
| < | Rocky Mountain Montane Grassland, Mixed Meadow Series, Mixed Forb-Grass Association - 142.411 | Brown et al. 1979 |  |
| >< | Tall Forb (409) | Shiflet 1994 |  |
| >< | Tufted Hairgrass - Sedge (313) | Shiflet 1994 | Forb-rich portions of this SRM type overlap with this group. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: K.A. Schulz, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and M. Jennings

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by M.E. Hall, M.S. Reid and T. Luna.

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.2.Nf. Western North American Grassland & Shrubland

M172. Northern Vancouverian Lowland-Montane Grassland & Shrubland

Type Concept Sentence: This macrogroup consists of low to tall shrublands, meadows, and mosaics of the two in coastal and southeastern Alaska and British Columbia. Shrublands dominate and characteristic species include, but are not limited to, *Alnus viridis, Rubus spectabilis, Salix alaxensis, Salix barclayi, Salix glauca, Elliottia pyroliflora, Athyrium filix-femina, Calamagrostis canadensis, Chamerion angustifolium, Heracleum maximum*, and *Veratrum viride*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nf. Western North American Grassland & Shrubland (D022)

Elcode: M172

\*Scientific Name: Northern Vancouverian Lowland-Montane Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Northern Vancouverian Lowland-Montane Grassland & Shrubland Macrogroup

\*Colloquial Name: Northern Vancouverian Lowland-Montane Grassland & Shrubland

\*Type Concept: This macrogroup consists of low to tall shrublands, meadows, and mosaics of the two in the Pacific Northwest region. Shrublands dominate and characteristic species include *Alnus viridis, Rubus spectabilis, Salix alaxensis, Salix barclayi, Salix glauca, Sambucus racemosa, Spiraea stevenii*, and *Vaccinium ovalifolium*. Meadows and grassland vegetation also occur and may be dominated by forbs, graminoids, or ferns. Dominant species include *Athyrium filix-femina, Calamagrostis canadensis, Chamerion angustifolium, Heracleum maximum, Veratrum viride*, and *Valeriana sitchensis*. Shrublands occur on flat to steep slopes at low to mid elevations (1-1000 m) in valleys, hills and mountains of the Aleutians; in southeastern Alaska and British Columbia they occur on mountain sideslopes from sea level to treeline where slopes are steep enough to produce frequent snowslides preventing forest development. Herbaceous stands include a wide variety meadows and grasslands that occur on all slopes and aspects with a mesic moisture regime, including windswept coastal headlands, coastal bluffs, old beach ridges, hillside slopes, stabilized talus, alluvial fans, rolling hills, alluvial slopes, below subalpine shrublands, ravine sideslopes and avalanche tracks. The macrogroup includes areas that are a mosaic of meadows with alder patches.

\*Diagnostic Characteristics: This type is either shrubland, grassland or meadow where characteristic shrubs include *Alnus viridis, Elliottia pyroliflora, Rubus spectabilis, Salix alaxensis, Salix barclayi, Salix glauca*, and *Vaccinium ovalifolium*; characteristic herbs include *Athyrium filix-femina, Heracleum maximum, Veratrum viride*, or a variety of other herbaceous species, and *Leymus mollis* cover is <25%.

\*Classification Comments: This is a mesic to moist upland macrogroup, but does not include wetland or swamp type shrublands, so the presence of willows is confusing. The moist stands overlap in composition with stands in ~Vancouverian Lowland Marsh, Wet Meadow & Shrubland Macrogroup (M073)$$ (i.e., ~Vancouverian Wet Shrubland Group (G322)$$ which also has *Alnus viridis, Rubus spectabilis, Salix* spp., and *Vaccinium* spp.). Also, the herbaceous species are wide-ranging and are not diagnostic to this macrogroup. Subalpine meadows are in ~Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow Macrogroup (M168)$$, whether coastal or interior. Some types within this macrogroup may be subalpine, but higher elevation species, such as *Senecio triangularis* or *Valeriana sitchensis*, would be found under a shrub cover, likely alder. If in an open meadow, they would presumably be in M168. How to distinguish northern moist meadows from subalpine meadows? There are, no doubt, species differences as well as overlap.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M168 | Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow |  |
| M073 | Vancouverian Lowland Marsh, Wet Meadow & Shrubland | including G322, significantly overlap on floristics and environmental dynamics. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Tall to short deciduous shrubs and/or herbaceous perennial grasslands or meadows dominated by perennial forbs.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Shrublands dominate and characteristic species include *Alnus viridis, Oplopanax horridus* (usually in the understory of other shrubs), *Rubus spectabilis, Salix alaxensis, Salix barclayi, Salix glauca* (willows, if present, are usually not dominant but companion shrubs, as indicators of wet conditions, but not swamp or wetland conditions), *Sambucus racemosa, Shepherdia canadensis, Spiraea stevenii, Vaccinium cespitosum, Vaccinium uliginosum*, and *Vaccinium ovalifolium*. Herbaceous stands may have one or more of the following species, which can also be dominant: *Athyrium filix-femina, Calamagrostis canadensis, Chamerion angustifolium, Heracleum maximum*, or *Veratrum viride*, or a combination of any of these. Additional forb species may include *Achillea millefolium var. borealis, Aconitum delphiniifolium, Angelica lucida, Antennaria dioica, Arnica unalaschcensis, Cardamine oligosperma var. kamtschatica, Castilleja unalaschcensis, Claytonia sibirica, Chrysanthemum arcticum ssp. arcticum (= Dendranthema arcticum ssp. arcticum), Dryopteris expansa, Geum calthifolium, Lupinus nootkatensis, Nephrophyllidium crista-galli, Polemonium acutiflorum, Ranunculus occidentalis, Sanguisorba canadensis, Senecio triangularis, Solidago canadensis var. lepida*, and *Valeriana capitata* or *Valeriana sitchensis*. Graminoids include *Agrostis exarata, Agrostis scabra, Carex macrochaeta, Deschampsia beringensis*, and *Festuca rubra*. The low subshrub *Empetrum nigrum* may also be common.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Alder can often dominate new ash deposits on the Alaska Peninsula. It also tolerates frequent disturbance from snowslides so dominates these sites. Dynamics of the herbaceous stands is unknown.

ENVIRONMENT

Environmental Description: This macrogroup occurs on flat to steep slopes (0-50°) at low to mid elevations (1-1000 m) in valleys, hills and mountains of the Aleutians; in southeastern Alaska and British Columbia it occurs on mountain sideslopes from sea level to treeline where slopes are steep enough to produce frequent snowslides preventing forest development. It is also found just above treeline and below the alpine throughout the maritime region of Alaska. Precipitation is abundant, and these shrublands are mesic to wet. Herbaceous stands occur on all slopes and aspects with a mesic to moist moisture regime, including windswept coastal headlands, coastal bluffs, old beach ridges, hillside slopes, stabilized talus, alluvial fans, rolling hills, alluvial slopes, montane shrublands, and ravine sideslopes. Soils are typically mesic to moist, well-drained, shallow, and stony, can be ash-covered, and underlain by colluvium, alluvium, glacial drift or till or residuum.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs on the Alaska Peninsula and Kodiak Island, south and east throughout the maritime regions of Alaska and British Columbia. It diminishes moving west, and is absent by Dutch Harbor in the Aleutians.

Nations: CA, US

States/Provinces: AK, BC

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G354 | Vancouverian Alder - Salmonberry - Willow Shrubland |
| G355 | Northern Vancouverian Grassland & Meadow |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: G. Kittel, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel and D. Meidinger

Acknowledgments [optional]:

Version Date: 29 Mar 2017

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2. Shrub & Herb Vegetation

2.B.2.Ng. Western North American Interior Chaparral

D061. Western North American Interior Chaparral

Type Concept Sentence: These chaparral shrublands occur between low-elevation desert landscapes and higher subalpine woodlands of the western U.S. and northern Mexico.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.2.Ng. Temperate Grassland & Shrubland (F012)

Elcode: D061

\*Scientific Name: *Arctostaphylos patula - Ceanothus cordulatus - Quercus turbinella* Interior Chaparral Division

\*Common (Translated Scientific) Name: Greenleaf Manzanita - Mountain Whitethorn - Sonoran Scrub Oak Interior Chaparral Division

\*Colloquial Name: Western North American Interior Chaparral

\*Type Concept: These are chaparral shrublands found among montane forests of the Cascades south into Baja California, Mexico, and east in scattered locations throughout the Great Basin, Colorado Plateau, and Rocky Mountains, and then across central Arizona (Mogollon Rim) and southern New Mexico, east in mountains across Trans-Pecos Texas, and south into the Madrean Occidentale and Madrean Oriental in northern Mexico. This vegetation is also found in desert mountains in the Sonoran, Mojave, and Chihuahuan deserts. These hardy shrublands are dominated by evergreen or winter-deciduous shrubs. Some stands can have closed canopies of shrubs with little undergrowth; others have more open canopies with a moderately to well-developed herbaceous layer in the canopy openings. Dominant and diagnostic shrubs throughout the more northerly portions of its range include *Arctostaphylos glandulosa, Arctostaphylos nevadensis, Arctostaphylos patula, Ceanothus cordulatus, Ceanothus diversifolius, Ceanothus integerrimus, Ceanothus pinetorum, Ceanothus sanguineus, Ceanothus velutinus, Cercocarpus intricatus, Cercocarpus montanus var. glaber, Chrysolepis sempervirens, Eriogonum fasciculatum, Garrya flavescens, Holodiscus discolor, Prunus emarginata, Prunus subcordata, Purshia stansburiana, Quercus garryana var. fruticosa, Quercus sadleriana, Quercus vacciniifolia*, and *Rhus trilobata*. Further south, *Quercus turbinella, Arctostaphylos pungens*, or *Ceanothus greggii* frequently dominant large areas. Other characteristic shrubs further south include *Cercocarpus montanus var. paucidentatus, Garrya wrightii, Quercus toumeyi*, and *Rhus trilobata* with *Arctostaphylos pringlei* and *Arctostaphylos pungens* at higher elevations. In desert chaparral stands in the southwestern ranges, *Arctostaphylos glauca, Arctostaphylos patula, Cercocarpus montanus var. glaber, Eriodictyon angustifolium, Garrya flavescens, Juniperus californica, Nolina parryi, Quercus berberidifolia, Quercus cornelius-mulleri, Quercus john-tuckeri, Rhamnus ilicifolia*, and *Rhus ovata* characterize this shrubland. In the southeastern range, stands in the Chihuahuan Desert mountains and the Sierra Madre Oriental are codominated by evergreen shrub oak species, such as *Quercus mohriana, Quercus pungens*, and *Quercus vaseyana*. The herbaceous layer is variable, but is generally composed of semi-arid perennial grasses. This division occurs on sideslopes between low-elevation desert landscapes and higher pinyon-juniper woodlands of the western and central Great Basin, on steep, exposed slopes with rocky and/or shallow soils, and among montane forests of the Rocky Mountains, Cascades and Sierra Nevada, above 1500 m (4550 feet) elevation where much of the annual precipitation occurs as snow. The shrubs are adapted to freezing temperatures and cold winters. Further south, stands are found on foothills, xeric mountain slopes and canyons in hotter and drier habitats and often dominate along the mid-elevation (1000-2500 m) transition zone between desert scrub and montane woodlands. Most of these chaparral species are fire-adapted, resprouting vigorously after burning or producing fire-resistant seeds. These variants may be short-duration chaparrals in previously forested areas that have experienced crown fires or recent logging.

\*Diagnostic Characteristics: This very widely distributed upland shrubland type is characterized by a very diverse set of diagnostic, mostly evergreen, sclerophyllous shrubs. In the Great Basin, Cascades, and Rocky Mountains these are open-canopy broad-leaved evergreen shrublands dominated by *Arctostaphylos patula, Arctostaphylos nevadensis, Ceanothus martinii, Ceanothus velutinus*. In California, chaparral or open shrubland is found among montane forests above 1500 m (4550 feet) elevation. Typical sclerophyllous chaparral shrubs include *Ceanothus cordulatus, Ceanothus diversifolius, Ceanothus pinetorum, Ceanothus integerrimus, Ceanothus velutinus, Chrysolepis sempervirens, Quercus sadleriana*, and *Quercus vacciniifolia*. Further east and south, *Arctostaphylos pungens, Quercus turbinella*, and *Ceanothus greggii* dominate large areas. Other diagnostic and often dominant shrubs include *Arctostaphylos pringlei, Cercocarpus montanus, Eriodictyon angustifolium, Garrya flavescens, Garrya ovata, Garrya wrightii, Juniperus californica, Quercus cornelius-mulleri, Quercus mohriana, Quercus pungens, Quercus toumeyi*, and *Quercus vaseyana*.

\*Classification Comments: Chaparral stands of the Klamath Mountain region of northern California and southwestern Oregon have elements that are more typical of this division and some California Floristic Province elements. Kealey and Davis (2007) noted that the species composition in this area was significantly dissimilar to that in chaparral of southern and central California. Currently treated in 2.B.1.Na ~Californian Scrub & Grassland Division (D327)$$, the composition of stands from this area and the Sierra Nevada west slope (including a representative range of elevations) should be examined in a regional context involving both divisions.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D327 | Californian Scrub & Grassland |  |
| D039 | North American Warm Desert Scrub & Grassland |  |

Similar NVC Types General Comments [optional]: Chaparral of ~Californian Chaparral Macrogroup (M043)$$ of 2.B.1.Na ~Californian Scrub & Grassland Division (D327)$$ has a higher percentage of species that are endemic to the California Floristic Province [see Classification Comments].

VEGETATION

Physiognomy and Structure Summary: This upland shrubland is typically dominated by a moderate to dense evergreen sclerophyllous (sometimes including winter deciduous) shrub canopy usually less than 3 m tall. Herbaceous layers may be present and are typically dominated by perennial graminoids.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: In California and the Oregon Cascades, these shrublands are typically dominated by evergreen sclerophyllous shrubs. Characteristic shrub species include *Ceanothus cordulatus, Ceanothus diversifolius, Ceanothus integerrimus, Ceanothus velutinus, Ceanothus pinetorum, Chrysolepis sempervirens (= Castanopsis sempervirens), Notholithocarpus densiflorus var. echinoides (= Lithocarpus densiflorus var. echinoides), Quercus sadleriana*, and *Quercus vacciniifolia*. Other evergreen species, such as *Arctostaphylos nevadensis, Arctostaphylos patula, Arctostaphylos manzanita*, and *Garrya fremontii*, are common in some stands. Characteristic winter-deciduous shrubs might dominate some stands, but are commonly present even where not dominant. They include *Prunus emarginata, Prunus subcordata*, and *Ceanothus sanguineus* (in Oregon), *Prunus virginiana, Holodiscus discolor (= Holodiscus microphyllus)*, and *Quercus garryana garryana var. fruticosa (= var. breweri)*. Other shrub species include *Amelanchier alnifolia, Symphoricarpos mollis, Chamaebatia foliolosa*, and *Cercocarpus* spp. Emergent *Abies concolor, Pinus lambertiana, Pinus jeffreyi, Pinus sabiniana, Pinus ponderosa, Pseudotsuga menziesii, Quercus chrysolepis, Quercus wislizeni*, and *Quercus kelloggii* trees may be present at sparse cover. The herbaceous layer is variable depending on cover of shrubs (dense shrublands have little understory) and substrate.

Further east, in the Great Basin, Colorado Plateau and Rocky Mountains, the diversity of shrubs tends to be less, but some species are shared with California montane chaparral. Characteristic shrubs include *Arctostaphylos patula, Arctostaphylos nevadensis, Ceanothus velutinus, Ceanothus martinii, Ceanothus prostratus*, and *Purshia stansburiana*. Other winter-deciduous shrubs are often present, including *Amelanchier alnifolia, Artemisia tridentata, Eriogonum* spp., *Prunus virginiana*, and *Symphoricarpos* spp. Emergent *Abies concolor, Juniperus osteosperma, Juniperus scopulorum, Pinus edulis, Pinus flexilis, Pinus monophylla, Pinus ponderosa, Pseudotsuga menziesii* trees may be present at sparse cover. The herbaceous layer is variable depending on cover of shrubs (dense shrublands have little understory) and substrate, but will include a variety of grass and forb taxa common to the Intermountain West and montane zones of the Rocky Mountains.

Further south, a moderate to dense evergreen shrub layer is dominated by the scrub oaks (*Quercus turbinella, Quercus intricata*, and *Quercus toumeyi*) along with wide diversity of other sclerophyllous shrubs that include *Ceanothus greggii, Cercocarpus montanus var. paucidentatus, Garrya wrightii*, and *Rhus trilobata*, with *Arctostaphylos pringlei* and *Arctostaphylos pungens* at higher elevations. In desert chaparral stands in the western extent, *Arctostaphylos glauca, Arctostaphylos patula, Cercocarpus montanus var. glaber, Garrya flavescens, Juniperus californica*, and *Nolina parryi, Quercus cornelius-mulleri, Rhamnus ilicifolia*, and *Rhus ovata*, characterize this shrubland. Scattered remnant pinyon and juniper trees may be present; however, in the western Mojave Desert, *Juniperus californica* sometimes forms an open, shrubby tree layer over the evergreen oaks and other shrubs. In the eastern extent, stands in the Chihuahuan Desert mountains and the Sierra Madre Oriental are dominated by evergreen shrub oak species, such as *Quercus mohriana, Quercus pungens*, and *Quercus vaseyana*, and several widespread chaparral species, such as *Arctostaphylos pungens, Ceanothus greggii, Cercocarpus montanus, Eriodictyon angustifolium, Fallugia paradoxa, Garrya wrightii*, and *Quercus grisea*. Other Madrean Orientale species include *Arbutus xalapensis (= Arbutus texana), Fraxinus greggii, Fendlera rigida (= Fendlera linearis), Garrya ovata, Juniperus pinchotii, Purshia mexicana, Rhus virens var. choriophylla (= Rhus choriophylla), Salvia lycioides (= Salvia ramosissima), Salvia roemeriana, Salvia regla* (Brown 1982a), and *Viguiera stenoloba*. The herbaceous layer is variable, but is generally composed of perennial grasses, such as *Achnatherum speciosum, Bouteloua curtipendula, Bouteloua hirsuta, Bothriochloa barbinodis, Eragrostis intermedia, Lycurus phleoides, Muhlenbergia emersleyi*, and several species of *Aristida*, which are largely restricted to rocky, protected areas because of past heavy livestock grazing. In rocky settings, pteridophytes (e.g., *Astrolepis* spp., *Cheilanthes* spp., *Notholaena standleyi, Selaginella* spp.) are often a component of this layer, and their abundance may exceed that of forbs.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Most of these chaparral species are fire-adapted, resprouting vigorously after burning or producing fire-resistant seeds. Some types within this division, especially those found among cold-temperate montane forests, may be short-duration chaparrals in previously forested areas that have experienced crown fires or recent logging. These chaparral patches likely shift across montane forested landscapes with catastrophic fire events. Chaparral found within the context of cold and warm deserts are likely to be far more persistent.

ENVIRONMENT

Environmental Description: This division occurs at montane elevations and in cold and warm semi-desert regions in the western U.S. and northern Mexico. The climate is seasonally warm to hot and may have a somewhat bi-modal precipitation regime with spring rains and warm-season monsoonal rains as well. Frosts tend to occur in winter, and snowpacks vary depending on latitude and orographic effects. This vegetation most typically occurs from 800 to 3000 m elevation, although it can occur as low as 50 m elevation in California. In warm desert mountains in the Sonoran, Mojave, and Chihuahuan deserts, stands are found on foothills, xeric mountain slopes and canyons in hotter and drier habitats. Further north, these shrublands are mostly found on steep, usually south-facing or exposed slopes, where soils are rocky, shallow and well-drained, often glaciated. This vegetation is found on widely varying substrates, with parent materials including igneous intrusives and extrusives, sedimentary, and metamorphics.

DISTRIBUTION

\*Geographic Range: These chaparral shrublands are found in often patchily distributed occurrences at montane elevations throughout much of the western U.S., from the Cascades east into the western Great Basin, Colorado Plateau, and Rocky Mountains, across central Arizona (Mogollon Rim) and southern New Mexico, east in mountains across Trans-Pecos Texas, and south into the Madrean Occidentale and Madrean Oriental in northern Mexico.

Nations: CA?, MX, US

States/Provinces: AB?, AZ, BC?, CA, CO, ID, MT?, MXBC, MXCH, MXCO, MXSO, NM, NV, OR, TX, UT, WA, WY

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M094 | Cool Interior Chaparral |
| M091 | Warm Interior Chaparral |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Lea and D. Faber-Langendoen, in Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: P. Comer and C. Lea

Acknowledgments [optional]:

Version Date: 07 Jan 2016

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2. Shrub & Herb Vegetation

2.B.2.Ng. Western North American Interior Chaparral

M094. Cool Interior Chaparral

Type Concept Sentence: These chaparral shrublands occur between low-elevation desert landscapes and higher subalpine woodlands of the Cascades, Sierra Nevada, and interior mountain ranges of the western U.S., generally among montane forests above 1500 m (4550 feet) elevation.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Ng. Western North American Interior Chaparral (D061)

Elcode: M094

\*Scientific Name: *Arctostaphylos patula - Ceanothus velutinus - Quercus vacciniifolia* Montane Chaparral Macrogroup

\*Common (Translated Scientific) Name: Greenleaf Manzanita - Snowbrush Ceanothus - Huckleberry Oak Montane Chaparral Macrogroup

\*Colloquial Name: Cool Interior Chaparral

\*Type Concept: These are chaparral shrublands found among montane forests of the Cascades south into Baja California, Mexico, and east in scattered locations on the eastern slope of the Sierra Nevada and Cascades and into the western Great Basin, Colorado Plateau, and Rocky Mountains. These hardy shrublands have open canopies with little undergrowth and are dominated by evergreen or winter-deciduous shrubs; some stands can have high densities of shrubs. Dominant and diagnostic shrubs include *Arctostaphylos glandulosa, Arctostaphylos nevadensis, Arctostaphylos patula, Ceanothus cordulatus, Ceanothus diversifolius, Ceanothus integerrimus, Ceanothus pinetorum, Ceanothus sanguineus* (in Oregon), *Ceanothus velutinus, Cercocarpus intricatus, Cercocarpus montanus var. glaber, Chrysolepis sempervirens, Eriogonum fasciculatum, Garrya flavescens, Holodiscus discolor, Prunus emarginata, Prunus subcordata, Purshia stansburiana, Quercus garryana var. fruticosa, Quercus sadleriana, Quercus vacciniifolia*, and *Rhus trilobata*. This macrogroup occurs on sideslopes between low-elevation desert landscapes and higher pinyon-juniper woodlands of the western and central Great Basin on steep, exposed slopes with rocky and/or shallow soils, and among montane forests of the Rocky Mountains, Cascades and Sierra Nevada, above 1500 m (4550 feet) elevation where much of the annual precipitation occurs as snow. The shrubs are adapted to freezing temperatures and cold winters. Most of these chaparral species are fire-adapted, resprouting vigorously after burning or producing fire-resistant seeds. These may be short-duration chaparrals in previously forested areas that have experienced crown fires or recent logging. Occurrences likely shift across montane forested landscapes with catastrophic fire events.

\*Diagnostic Characteristics: In the Great Basin, Cascades, and Rocky Mountains these are open-canopy broad-leaved evergreen shrublands dominated by *Arctostaphylos patula, Arctostaphylos nevadensis, Ceanothus martinii, Ceanothus velutinus*, and *Purshia stansburiana* (deciduous, but included here). In California, chaparral or open shrubland found among montane forests above 1500 m (4550 feet) elevation. Typical sclerophyllous chaparral shrubs include *Ceanothus cordulatus, Ceanothus diversifolius, Ceanothus pinetorum, Ceanothus integerrimus, Ceanothus velutinus, Chrysolepis sempervirens, Quercus sadleriana*, and *Quercus vacciniifolia*. Winter-deciduous shrubs may dominate, such as *Prunus emarginata, Prunus subcordata*, and *Ceanothus sanguineus* (in Oregon), *Holodiscus discolor*, and *Quercus garryana var. fruticosa* (in California).

\*Classification Comments: Sawyer et al. (2009) place shrublands dominated by *Ceanothus integerrimus, Prunus emarginata, Holodiscus discolor*, and *Quercus garryana var. fruticosa* into a Southern Vancouverian Montane Deciduous Scrub group or a Rock Outcrop group for the *Holodiscus* shrublands, but no such groups currently have been defined within existing macrogroups. While these taxa are deciduous rather than evergreen, they occur in the same areas as the chaparrals, and often have shared floristic characteristics as the *Arctostaphylos, Ceanothus, Chrysolepis* and evergreen oak shrublands. For now these types are placed in this cool montane chaparral macrogroup. *Ceanothus fendleri* associations might best fit here. A provisional association dominated by *Arctostaphylos columbiana* has been reported from Olympic National Park and is described as occurring south into the Cascades; while poorly known or described, it is included here for now. *Purshia stansburiana* is not a species commonly thought of as chaparral. However, on the Colorado Plateau and into the Grand Canyon region, it is often associated with *Arctostaphylos patula*. For now, associations dominated by *Purshia stansburiana* are included in this macrogroup, but perhaps better belong in some other. ~*Ceanothus velutinus* Shrubland (CEGL002167)$$ was listed in this type but is being moved out, probably to ~Central Rocky Mountain Montane-Foothill Grassland & Shrubland Macrogroup (M048)$$. Linda Vance (pers. comm. 2014) considers this type to be very unlikely in Montana.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M043 | Californian Chaparral |  |
| M049 | Southern Rocky Mountain Montane Shrubland | also falls within Brown (1982a) Great Basin Montane Scrubland (132.1). |
| M091 | Warm Interior Chaparral | shares some floristics, but only in a few wide-ranging shrub taxa; each have diagnostic taxa that are not shared. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Tall persistent or post fire shrublands 1-3 m tall, broad-leaved evergreen or winter deciduous, generally little to no undergrowth.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: In California and the Oregon Cascades, these shrublands are typically dominated by sclerophyllous shrubs. Characteristic shrub species include *Ceanothus cordulatus, Ceanothus diversifolius, Ceanothus integerrimus, Ceanothus velutinus, Ceanothus pinetorum, Chrysolepis sempervirens (= Castanopsis sempervirens), Notholithocarpus densiflorus var. echinoides (= Lithocarpus densiflorus var. echinoides), Quercus sadleriana*, and *Quercus vacciniifolia*. Other evergreen species, such as *Arctostaphylos nevadensis, Arctostaphylos patula, Arctostaphylos manzanita*, and *Garrya fremontii*, are common in some stands. Characteristic winter-deciduous shrubs might dominate some stands, but are commonly present even where not dominant, such as *Prunus emarginata, Prunus subcordata*, and *Ceanothus sanguineus* (in Oregon), *Prunus virginiana, Holodiscus discolor (= Holodiscus microphyllus)*, and *Quercus garryana var. fruticosa (= var. breweri)*. Other shrub species include *Amelanchier alnifolia, Symphoricarpos mollis, Chamaebatia foliolosa*, and *Cercocarpus* spp. Emergent *Abies concolor, Pinus lambertiana, Pinus jeffreyi, Pinus sabiniana, Pinus ponderosa, Pseudotsuga menziesii, Quercus chrysolepis, Quercus wislizeni*, and *Quercus kelloggii* trees may be present at sparse cover. The herbaceous layer is variable depending on cover of shrubs (dense shrublands have little understory) and substrate.

Further east, in the Great Basin, Colorado Plateau and Rocky Mountains, the diversity of shrubs tends to be less, but some species are shared with California montane chaparral. Characteristic shrubs include *Arctostaphylos patula, Arctostaphylos nevadensis, Ceanothus velutinus, Ceanothus martinii, Ceanothus prostratus*, and *Purshia stansburiana*. Other winter-deciduous shrubs are often present, including *Amelanchier alnifolia, Artemisia tridentata, Eriogonum* spp., *Prunus virginiana*, and *Symphoricarpos* spp. Emergent *Abies concolor, Juniperus osteosperma, Juniperus scopulorum, Pinus edulis, Pinus flexilis, Pinus monophylla, Pinus ponderosa, Pseudotsuga menziesii* trees may be present at sparse cover. The herbaceous layer is variable depending on cover of shrubs (dense shrublands have little understory) and substrate, but will include a variety of grass and forb taxa common to the Intermountain West and montane zones of the Rocky Mountains.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Two phases are recognized: first, early-seral and post-fire or post-logging shrub fields with few conifers; and second, edaphically controlled sites, with soils that are too dry or shallow-soiled for trees, hence sites where shrubs stay dominant (such as *Quercus vacciniifolia, Chrysolepis sempervirens*). Most chaparral species are fire-adapted, resprouting vigorously after burning or producing fire-resistant seeds. Occurrences of this macrogroup likely shift across montane forested landscapes with catastrophic fire events. Clearcut logging can also trigger regeneration of some of the chaparral species.

ENVIRONMENT

Environmental Description: These are chaparral or open shrublands found at montane elevations throughout much of the western U.S., from the Sierra Nevada and Cascades and into the western Great Basin, Colorado Plateau, and Rocky Mountains. They occur in summer-dry habitats from 800 to 3000 m elevation. Can occur as low as 50 m in California, but mostly is found above 1500 m. Much of the precipitation comes as winter snow, and summer drought-stress is characteristic. These shrublands are mostly found on steep, usually south-facing or exposed slopes, where soils are rocky, shallow and well-drained, often glaciated. These are typically zonal disclimax or, occasionally, edaphic climax brushfields which occur in association with dry needle-leaved evergreen forests or woodlands. These shrublands are typically established after stand-replacing fires or clearcut logging in montane conifer forests or pinyon-juniper woodlands, and may be seral to forest after several decades. Excessively rocky or droughty, fire-prone sites in the forest may support relatively persistent stands of this macrogroup. These are in mosaics of woodlands and chaparral and may have conifer species invading if good seed source is available.

DISTRIBUTION

\*Geographic Range: Very widely distributed, but these are small or patchily distributed occurrences in many areas. Found from southern Cascades of Oregon to the Klamath Mountains and Peninsular Ranges of California into Baja California, Mexico, and east into the western and central Great Basin, east slopes of the Sierra Nevada and Cascades. It is also found in limited, small-patch occurrences throughout the montane zone of mountain ranges in the western U.S.

Nations: CA?, MX, US

States/Provinces: AB?, AZ, BC?, CA, CO, ID, MT?, MXBC, NM, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]: 261B:CC, 263A:CC, 313A:??, 322A:??, 341A:CP, 341D:CC, 341E:CC, 341F:CC, 341G:CC, 342B:CC, 342C:CC, 342J:CP, M242B:??, M261A:CC, M261B:CC, M261C:CC, M261D:CC, M261E:CC, M261F:CC, M261G:CC, M341A:CC, M341D:CP

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G282 | Western North American Montane Sclerophyll Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Bittercherry (419) | Shiflet 1994 | Sierran chaparral on east side includes *Prunus emarginata* shrublands. |
| >< | Great Basin Montane Scrubland (132.1) | Brown 1982a | Not equivalent, but Brown's (1982a) type includes the concept of this macrogroup. His type is under his Cold-temperate Scrublands. |
| < | Montane Shrubland (209) | Shiflet 1994 |  |
| < | Snowbush (420) | Shiflet 1994 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M.S. Reid, G. Kittel, and K.A. Schulz

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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Sawyer, J. O., T. Keeler-Wolf, and J. Evens. 2009. A manual of California vegetation. Second edition. California Native Plant Society, Sacramento CA. 1300 pp.

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Vance, Ph.D., Linda. Personal communication. Senior Ecologist/Spatial Analysis Lab Director, Montana Natural Heritage Program, Helena, MT.

2. Shrub & Herb Vegetation

2.B.2.Ng. Western North American Interior Chaparral

M091. Warm Interior Chaparral

Type Concept Sentence: This macrogroup includes all the interior chaparral in the southwestern U.S. and northern Mexico and is composed of a very diverse list of diagnostic, mostly evergreen shrubs such as *Arctostaphylos pungens, Ceanothus greggii, Garrya wrightii*, and *Quercus turbinella* which dominate large areas on foothills, xeric mountain slopes and canyons.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Ng. Western North American Interior Chaparral (D061)

Elcode: M091

\*Scientific Name: *Quercus turbinella - Arctostaphylos pungens - Ceanothus greggii* Warm Interior Chaparral Macrogroup

\*Common (Translated Scientific) Name: Sonoran Scrub Oak - Pointleaf Manzanita - Desert Ceanothus Warm Interior Chaparral Macrogroup

\*Colloquial Name: Warm Interior Chaparral

\*Type Concept: This interior chaparral macrogroup occurs across central Arizona (Mogollon Rim) and southern New Mexico, east in mountains across Trans-Pecos Texas, and south into the Madrean Occidentale and Madrean Oriental in northern Mexico. Occurrences are also found in desert mountains in the Sonoran and Mojave deserts. The vegetation is characterized by a moderate to dense evergreen shrub layer less than 3 m tall that is dominated by scrub oak and sclerophyllous shrubs. Widespread diagnostic species *Quercus turbinella, Arctostaphylos pungens* or *Ceanothus greggii* frequently dominant large areas. Other characteristic shrubs include *Cercocarpus montanus var. paucidentatus, Garrya wrightii, Quercus toumeyi*, and *Rhus trilobata* with *Arctostaphylos pringlei* and *Arctostaphylos pungens* at higher elevations. In desert chaparral stands in the western extent, *Arctostaphylos glauca, Arctostaphylos patula, Cercocarpus montanus var. glaber, Eriodictyon angustifolium, Garrya flavescens, Juniperus californica, Nolina parryi, Quercus berberidifolia, Quercus cornelius-mulleri, Quercus john-tuckeri, Rhamnus ilicifolia*, and *Rhus ovata* characterize this shrubland. In the eastern extent, stands in the Chihuahuan Desert mountains and the Sierra Madre Oriental are dominated by evergreen shrub oak species, such as *Quercus mohriana, Quercus pungens*, and *Quercus vaseyana*, and several widespread chaparral species, such as *Arctostaphylos pungens, Ceanothus greggii*, and *Garrya wrightii*. Additional characteristic Madrean species are may be present such as *Arbutus xalapensis, Fendlera rigida, Garrya ovata, Purshia mexicana, Rhus virens var. choriophylla*, and several species of *Salvia*. The herbaceous layer variable, but is generally composed of semi-arid perennial grasses. Stands are found on foothills, xeric mountain slopes and canyons in hotter and drier habitats and often dominate along the mid-elevation (1000-2500 m) transition zone between desert scrub and montane woodlands. Sites are often steep and rocky.

\*Diagnostic Characteristics: This wide-ranging upland shrubland is characterized by a very diverse list of diagnostic, mostly evergreen shrubs. *Arctostaphylos pungens, Quercus turbinella*, and *Ceanothus greggii* dominate large areas. Other diagnostic and often dominant shrubs include *Arctostaphylos pringlei, Cercocarpus montanus, Eriodictyon angustifolium, Garrya flavescens, Garrya ovata, Garrya wrightii, Juniperus californica, Quercus cornelius-mulleri, Quercus mohriana, Quercus pungens, Quercus toumeyi*, and *Quercus vaseyana*.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M043 | Californian Chaparral |  |
| M094 | Cool Interior Chaparral | does share some floristics, but only in a few wide-ranging shrub taxa; each have diagnostic taxa that are not shared. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This upland shrubland is typically dominated by a moderate to dense evergreen sclerophyllous shrub canopy usually less than 3 m tall. Herbaceous layers may be present and are typically dominated by perennial graminoids.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The vegetation is characterized by a moderate to dense evergreen shrub layer less than 3 m tall that is dominated by the scrub oaks (*Quercus turbinella, Quercus intricata*, and *Quercus toumeyi*) along with wide diversity of other sclerophyllous shrubs that include *Ceanothus greggii, Cercocarpus montanus var. paucidentatus, Garrya wrightii*, and *Rhus trilobata*, with *Arctostaphylos pringlei* and *Arctostaphylos pungens* at higher elevations (Carmichael et al. 1978). In desert chaparral stands in the western extent, *Arctostaphylos glauca, Arctostaphylos patula, Cercocarpus montanus var. glaber, Garrya flavescens, Juniperus californica*, and *Nolina parryi, Quercus cornelius-mulleri, Rhamnus ilicifolia*, and *Rhus ovata*, characterize this shrubland (Keeler-Wolf 2007). Scattered remnant pinyon and juniper trees may be present; however, in the western Mojave, *Juniperus californica* sometimes forms an open, shrubby tree layer over the evergreen oaks and other shrubs (Keeler-Wolf 2007). In the eastern extent, stands in the Chihuahuan Desert mountains and the Sierra Madre Oriental are dominated by evergreen shrub oak species, such as *Quercus mohriana, Quercus pungens*, and *Quercus vaseyana*, and several widespread chaparral species, such as *Arctostaphylos pungens, Ceanothus greggii, Cercocarpus montanus, Eriodictyon angustifolium, Fallugia paradoxa*, and *Garrya wrightii*. Other Madrean Orientale species include *Arbutus xalapensis (= Arbutus texana), Fraxinus greggii, Fendlera rigida (= Fendlera linearis), Garrya ovata, Juniperus pinchotii, Purshia mexicana, Rhus virens var. choriophylla (= Rhus choriophylla), Salvia lycioides (= Salvia ramosissima), Salvia roemeriana*, and *Salvia regla* (Brown 1982a). The herbaceous layer is variable, but is generally composed of perennial grasses, such as *Achnatherum speciosum, Bouteloua curtipendula, Bouteloua hirsuta, Bothriochloa barbinodis, Eragrostis intermedia, Lycurus phleoides, Muhlenbergia emersleyi*, and several species of *Aristida*, which are largely restricted to rocky, protected areas because of past heavy livestock grazing (Brown 1982a).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Many of the communities in this macrogroup are dominated by fire-adapted shrubs. *Quercus cornelius-mulleri* sprouts vigorously from root crowns after fire. Since *Quercus cornelius-mulleri* chaparral occurs in areas of lower rainfall and sparser vegetation cover, it typically has less frequent fire and slower recovery rates than typical cismontane chaparral types elsewhere in California. *Quercus turbinella* in Arizona and New Mexico is a fire-type; it sprouts vigorously from the root crown and rhizomes. Typical fire intervals in Arizona exceed 74 years (Reid et al. 1999, Tirmenstein 1999d). Plants in the New York Mountains of California are treelike, suggesting that fires have been absent for perhaps greater than 100 years. Instead, flooding has initiated stem breakage and sprouting of some canyon bottom stands. *Ceanothus greggii* is an obligate seeder and germinates from seed after fire, and older stands will lose dominance of this shrub to other longer-lived sprouting shrubs.

Site conditions aside, the dynamics of fire within chaparral are still complex. In southern California, it has been suggested that the even-aged and large size of modern chaparral patches are a function of 20th century fire suppression feedbacks whereby intensive suppression has led to large fuel buildups over large areas of landscape leading to large stand-replacement fires of ever increasing size (Minnich 1983, 2001). Others contend that the large patch patterns are within that natural range of variability, and that they are driven more by climate trends, prevailing weather patterns, increased human ignition frequencies with increased population density, changes in land use, and landscape characteristics rather than suppression (Keeley and Fotheringham 2001a, 2001c, Moritz 2003). The pattern of chaparral distribution in southern New Mexico suggests that the latter scenario might be the case here. Because of the rugged country, effective suppression has been minimal. Hence, the large patches of chaparral may be representative of a more or less natural fire regime, but one possibly modified by increased human caused fires and fire suppression on neighboring forested lands. More frequent, intense fires leads to the decline of the grassy woodland savannas on the ridge top summits and a favoring of shrublands (possibly enhanced by increased fine fuels with the cessation of livestock grazing). In this type of fire regime, Keeley and Fotheringham (2001a) and Moritz (2003) contend that prescribed burning may be useless or even harmful and that fire suppression, at least in the short term, may be more appropriate for maintaining an ecosystem near its natural state. Minnich (2001) would likely argue the opposite saying it is fire suppression that generates the large patch pattern and that prescribed fire is needed to restore a small patch mosaic with imbedded natural fuel firebreaks. Detailed fire history studies that focus on chaparral patch age structure in a landscape context would be useful (and perhaps necessary) to help resolve these conflicting viewpoints and generate management options that are tailored to interior chaparral.

At the other end of the elevation spectrum, repeated burning of chaparral, particularly Pinchot juniper, has been suggested as a way to increase grass cover in shrubland communities (Ahlstrand 1982). Most of our understanding of how to manage of Pinchot juniper comes from the high Plains of Texas where it is seen as an invader of fine textured plains grasslands soils, and where management has focused on control and eradication to increase livestock forage. Research from the high plains indicates that the effectiveness of fire in controlling Pinchot juniper is a function of fire intensity, climatic conditions and position of the bud zone above or below the soil (Steuter and Britton 1983). Fire was particularly effective in inducing mortality in young plants with exposed buds on rocky sites, but this dropped off significantly with older plants. In addition, increased grass cover (grama grasses) can inhibit reproduction (Smith et al. 1975). As Ahlstrand (1982) has shown, fires can lead to at least short-term increases in grass cover, but because Pinchot juniper can recover 50% or more of its original cover within six or seven years of a burn, repeated prescribed fires at 10- to 15-year intervals would be needed to sustain a grassland type.

ENVIRONMENT

Environmental Description: This macrogroup occurs across central Arizona (Mogollon Rim) and southern New Mexico, east in mountains across Trans-Pecos Texas, and south into the Madrean Occidentale and Madrean Oriental in northern Mexico. Occurrences are also found in desert mountains in the Sonoran and Mojave deserts. Stands are found on foothills, xeric mountain slopes and canyons in hotter and drier habitats. They often dominate along the mid-elevation (1000-2500 m) transition zone between desert scrub and montane woodlands (encinal, pine-oak, and ponderosa pine). Sites are variable but often steep and rocky. Sometimes this macrogroup occurs in thickets along upper canyon watercourses and northerly upland slopes within the pinyon-juniper woodland zone.

*Climate:* This macrogroup occurs in warm semi-desert regions in the southwestern U.S. The climate is hot and may have a somewhat bi-modal precipitation regime with spring rains and warm-season monsoonal rains as well. Frosts occur in winter, and even sometime snows, which will melt rapidly. *Soil/substrate/hydrology:* Parent materials are varied. This macrogroup is found on igneous intrusives and extrusives, sedimentary, and metamorphic including andesite, basalt, diabase, gneiss, schist, shale, slate, rhyolite, sandstone, tuff, and, more commonly, limestone and coarse-textured granitic substrates.

DISTRIBUTION

\*Geographic Range: This macrogroup is found across the southern portion of the southwestern U.S. and northern Mexico. The core distributions is in central Arizona (Mogollon Rim) and southwestern New Mexico south into Madrean Occidentale and Madrean Oriental in northern Mexico. Scattered locations occur in desert mountains extending west into the Sonoran Desert, Baja Norte to the western Mojave Desert, and east across Trans-Pecos Texas.

Nations: MX, US

States/Provinces: AZ, CA, MXBC, MXCH, MXCO, MXSO, NM, NV, TX, UT

USFS Ecoregions (2007) [optional]: 313A:CC, 313B:CC, 313C:CC, 313D:CC, 315A:CC, 315H:CC, 321A:CC, 322A:CC, 322B:CC, 322C:CC, 341A:CP, 341F:CC, M261E:CC, M313A:CC, M313B:CC, M341C:??

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G280 | Eastern Madrean Chaparral |
| G281 | Western Madrean Chaparral |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | "Arizona" Chaparral | Brown 1982a |  |
| < | "Coahuilan" Chaparral | Brown et al. 1979 |  |
| = | Arizona Chaparral (503) | Shiflet 1994 |  |
| < | Chihuahuan Interior (Coahuila) Chaparral - 133.4 | Brown et al. 1998 |  |
| < | Desert Chaparral | Keeler-Wolf 2007 |  |
| = | Interior Chaparral -133.3 | Brown et al. 1979 |  |
| > | Interior Chaparral -133.3 | Brown 1982a |  |
| < | Scrub Oak Series, *Quercus intricata-Cercocarpus* spp. Association -133.316 | Brown et al. 1979 |  |
| < | Scrub Oak Series, *Quercus intricata-Quercus* spp. Association -133.317 | Brown et al. 1979 |  |
| < | Scrub Oak Series, *Quercus intricata* Association -133.315 | Brown et al. 1979 |  |
| < | Scrub Oak Series, *Quercus intricata*-mixed sclerophyll Association -133.318 | Brown et al. 1979 |  |
| < | Scrub Oak Series, *Quercus turbinella-Cercocarpus betuloides* Association -133.313 | Brown et al. 1979 |  |
| < | Scrub Oak Series, *Quercus turbinella-Cercocarpus breviflorus* Association -133.312 | Brown et al. 1979 |  |
| < | Scrub Oak Series, *Quercus turbinella* Association -133.311 | Brown et al. 1979 |  |
| < | Scrub Oak Series, *Quercus turbinella*-mixed sclerophyll Association -133.314 | Brown et al. 1979 |  |
| < | Silktassel Series, *Garrya ovata* Association -133.352 | Brown et al. 1979 |  |
| < | Silktassel Series, *Garrya wrightii* Association -133.351 | Brown et al. 1979 |  |
| < | Southwestern Interior (Arizona) Chaparral - 133.3 | Brown et al. 1998 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D.E. Brown, C.H. Lowe, and C.P. Pase (1979)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and E.H. Muldavin

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.2.Nh. Southeastern North American Grassland & Shrubland

D102. Southeastern North American Grassland & Shrubland

Type Concept Sentence: This division encompasses a diversity of grass-, herb-, and shrub-dominated communities of the Southeastern Coastal Plain and locally as far west as the Edwards Plateau of Texas. Vegetation occurs on a wide variety of soil types and depths, with highly acidic to basic pH, and deep loams to bare rock, sometimes in combination with natural fire disturbances that collectively prevent tree establishment. Vegetation types are colloquially known as barrens, flatrocks, glades, and prairies.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.2.Nh. Temperate Grassland & Shrubland (F012)

Elcode: D102

\*Scientific Name: *Schizachyrium tenerum - Aristida beyrichiana - Manfreda virginica* Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Slender Little Bluestem - Beyrich's Three-awn - False Aloe Grassland & Shrubland Division

\*Colloquial Name: Southeastern North American Grassland & Shrubland

\*Type Concept: This division encompasses a diversity of grass- and shrub-dominated vegetation types in the southeastern and relatively moist parts of the south-central United States. As these communities occur under climatic conditions that support forested communities, their physiognomy is dependent on one or more factors that preclude or limit tree growth: fire, shallow depth, dry topographic situation, salinity or other "difficult" soil conditions, or natural or anthropogenic disturbances. With the exception of ~Southeastern Ruderal Grassland & Shrubland Macrogroup (M307)$$, these communities have high levels of endemism and disjunction. They also have a high degree of uniqueness or discordance in composition as compared to surrounding (forested) matrix communities, with many heliophytic species that are regionally rare or uncommon. There is high fine-scale diversity / species-packing in these communities, and also a high level of uniqueness of individual community types as compared to the group as a whole, this uniqueness strongly correlated with geography and edaphic variation across the heterogeneity included in this division. This makes the division as a whole difficult to characterize compositionally. Biogeographically, and at the species level, there is an admixture of southeastern United States endemics, species peripheral or disjunct from more western (*Phemeranthus*), northwestern, or northern grassland and shrubland divisions, and primarily in ~Florida Peninsula Scrub & Herb Macrogroup (M162)$$ some tropical components (*Licania*). At the family and genus level, there are some regionally endemic components (*Marshallia, Serenoa*) and in widespread genera, such as *Andropogon, Baptisia, Sporobolus, Schizachyrium, Liatris, Helianthus, Rudbeckia*, a high diversity of individual species, many with narrow distributions. Families that are strongly represented in this division (both in cover/dominance and in diversity of species present) are Poaceae and Asteraceae. Brassicaceae is also prominent in ~Southern Barrens & Glade Macrogroup (M308)$$. Perennials predominate in most macrogroups, but annuals are frequent and diverse in M308.

\*Diagnostic Characteristics: Further review is needed to determine diagnostic species.

\*Classification Comments: The four macrogroups included in this division are quite disparate in floristic composition, dynamics, and ecological drivers. M307 is weedy and highly variable from site to site based on local anthropogenic disturbance sequence and is compositionally composed of generalists and secondary successional opportunists. While M309 has many distinctive Southeastern Coastal Plain floristic elements, it also shows strong affinities in dominant species, dynamics, and structure to 2.B.2.Nc ~Eastern North American Grassland & Shrubland Division (D024)$$ and is a southern analogue of that division. Likewise, M308 consists primarily of rare Coastal Plain communities with exposed flat to gently sloping rock, and shows both its own distinctive floristic composition, but also close relationships to M508 and M509 in D024. Lastly, M162 "faces south rather than north" and is in some ways the southern end of the floristically highly distinctive {Longleaf}, without the open canopy of that division.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D023 | Central North American Grassland & Shrubland |  |
| D026 | Eastern North American Coastal Scrub & Herb Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The division includes mainly grass-dominated communities, with less common forbs, shrubs, and stunted or widely scattered trees. But, especially in ~Florida Peninsula Scrub & Herb Macrogroup (M162)$$, shrubs may be patchily or generally dominant. ~Southern Barrens & Glade Macrogroup (M308)$$ characteristically has zonal or patchy mixed physiognomy of bare rock zones, lichen- and/or moss-dominated zones, annual-dominated zones, perennial-dominated (grass or forb) zones, shrub-dominated zones, and patchy treed areas.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Biogeographically, and at the species level, there is an admixture of southeastern United States endemics, species peripheral or disjunct from more western (*Phemeranthus*), northwestern, or northern grassland and shrubland divisions, and primarily in ~Florida Peninsula Scrub & Herb Macrogroup (M162)$$ some tropical components (*Licania*). At the family and genus level, there are some regionally endemic components (*Marshallia, Serenoa*) and in widespread genera, such as *Andropogon, Baptisia, Sporobolus, Schizachyrium, Liatris, Helianthus, Rudbeckia*, a high diversity of individual species, many with narrow distributions. Families that are strongly represented in this division (both in cover/dominance and in diversity of species present) are Poaceae and Asteraceae. Brassicaceae is also prominent in ~Southern Barrens & Glade Macrogroup (M308)$$. Perennials predominate in most macrogroups, but annuals are frequent and diverse in M308.

Characteristic (but see above comment about the heterogeneity of the division) woody plants (shrubs, stunted trees, and lianas) can include *Bejaria racemosa, Ceratiola ericoides, Ilex glabra, Licania michauxii, Lyonia ferruginea, Lyonia fruticosa, Lyonia lucida, Quercus chapmanii, Quercus geminata, Quercus inopina, Quercus minima, Quercus myrtifolia*, and *Serenoa repens*. Characteristic graminoids (but see above comment about the heterogeneity of the division) can include *Andropogon floridanus, Andropogon gerardii, Andropogon glomeratus, Andropogon ternarius, Andropogon virginicus, Aristida beyrichiana, Aristida spiciformis, Bouteloua curtipendula, Carex cherokeensis, Dichanthelium dichotomum var. ensifolium, Dichanthelium strigosum, Muhlenbergia capillaris, Panicum virgatum, Paspalum floridanum, Paspalum setaceum, Piptochaetium avenaceum, Rhynchospora megalocarpa, Schizachyrium scoparium var. scoparium, Schizachyrium scoparium var. stoloniferum, Schizachyrium tenerum, Schoenus nigricans, Sorghastrum nutans, Sorghastrum secundum, Sporobolus clandestinus, Sporobolus vaginiflorus*, and *Tripsacum dactyloides*. Characteristic forbs (but see above comment about the heterogeneity of the division) include: *Allium cuthbertii, Bigelowia nuttallii, Coreopsis* spp., *Croton* spp., *Dalea* spp., *Echinacea* spp., *Lesquerella* spp., *Liatris* spp., *Manfreda virginica, Marshallia* spp., *Ratibida pinnata, Rudbeckia* spp., *Sedum nuttallianum, Sedum pulchellum*, and *Tephrosia virginiana*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: ~Florida Peninsula Scrub & Herb Macrogroup (M162)$$ and ~Southeastern Coastal Plain Patch Prairie Macrogroup (M309)$$ have frequent fire as an important natural disturbance. Fire is also important in some zones of examples of ~Southern Barrens & Glade Macrogroup (M308)$$, but fire is precluded in others by open rock and fuel too sparse to carry fire. M308 is structured more importantly by soil depth and periodic droughts which kill woody vegetation. The dynamics of ~Southeastern Ruderal Grassland & Shrubland Macrogroup (M307)$$ is dominated by secondary successional processes following anthropogenic disturbance.

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range: This type occurs in localized areas throughout the southeastern United States Coastal Plain and adjacent provinces to the west (Edwards Plateau).

Nations: MX?, US

States/Provinces: AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA, WV

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M162 | Florida Peninsula Scrub & Herb |
| M309 | Southeastern Coastal Plain Patch Prairie |
| M308 | Southern Barrens & Glade |
| M307 | Southeastern Ruderal Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: A.S. Weakley

Acknowledgments [optional]:

Version Date: 20 Jan 2016

REFERENCES

\*References [Required if used in text]:

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2. Shrub & Herb Vegetation

2.B.2.Nh. Southeastern North American Grassland & Shrubland

M162. Florida Peninsula Scrub & Herb

Type Concept Sentence: This open shrub-dominated (oak scrub and scrubby flatwoods) and herb-dominated (dry prairie) vegetation occurs primarily in the Florida Peninsula, and some in southeastern Georgia, where sites are codominated by *Aristida beyrichiana, Ceratiola ericoides, Quercus geminata, Quercus myrtifolia*, or *Serenoa repens*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nh. Southeastern North American Grassland & Shrubland (D102)

Elcode: M162

\*Scientific Name: *Serenoa repens - Quercus myrtifolia / Aristida beyrichiana* Scrub & Dry Prairie Macrogroup

\*Common (Translated Scientific) Name: Saw Palmetto - Myrtle Oak / Beyrich's Three-awn Scrub & Dry Prairie Macrogroup

\*Colloquial Name: Florida Peninsula Scrub & Herb

\*Type Concept: These open prairies and shrublands mainly occur in the Florida Peninsula. Sites lack trees and are codominated by *Aristida beyrichiana, Ceratiola ericoides, Quercus geminata, Quercus myrtifolia*, or *Serenoa repens*. Dry prairie sites are generally open shrubby grasslands. They are essentially treeless areas dominated by *Serenoa repens* and other low shrubs, such as *Bejaria racemosa, Ilex glabra, Lyonia fruticosa, Lyonia lucida*, and *Quercus minima*, as well as a variety of grasses, such as *Andropogon ternarius, Aristida beyrichiana, Aristida spiciformis, Schizachyrium scoparium var. stoloniferum*, and *Sorghastrum secundum*. In oak scrub and scrubby flatwoods sites, *Ceratiola ericoides, Licania michauxii, Lyonia ferruginea, Quercus chapmanii, Quercus geminata, Quercus inopina, Quercus myrtifolia*, and *Serenoa repens* are the most important shrub species. Shrubs can have very high cover in scrub sites. While in dry prairie sites shrubs tend to be <0.5 m tall, in scrub sites, shrubs can be 2-3 m tall. The height of the shrubs depends on the species present and the time since last fire.

\*Diagnostic Characteristics: Open treeless or nearly treeless prairies or scrub codominated by *Aristida beyrichiana, Ceratiola ericoides, Quercus geminata, Quercus myrtifolia*, or *Serenoa repens*. This macrogroup virtually lacks trees; it does not include woodlands. It is separated by physiognomic and floristic factors; the palm shrub physiognomy with *Serenoa repens* mixed with graminoids or broad-leaved evergreen shrubs is characteristic. It is limited to the Florida Peninsula and southeast Georgia.

\*Classification Comments: This macrogroup is broadly differentiated based on floristics, especially codominance by *Serenoa repens* and grassland or shrubland physiognomy, but there is similar vegetation (classified in ~Longleaf Pine Woodland Macrogroup (M007)$$) which has an open tree canopy of *Pinus elliottii var. densa, Pinus clausa*, or *Pinus palustris*. The scrub and the dry prairie are fairly different in hydrology, soils, and dominant species. Dry prairie is generally thought of in Florida as "flatwoods without the pines." It has higher fire frequency combined with regular flooding at the beginning of the growing season, which prevents pine seedling establishment (Platt et al. 2006a). Whereas for scrub, other than saw palmetto, dry prairie does not share any shrubs with scrub, although it does share some with scrubby flatwoods which is ecotonal between scrub and flatwoods. It also shares *Aristida stricta* with scrubby flatwoods, but not with scrub (A Johnson pers. comm. 2014).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M007 | Longleaf Pine Woodland | contains woodlands of *Pinus palustris* or *Pinus clausa* which occur across many sites on dry xeric sands to Spodosols and wet Ultisols. |
| M309 | Southeastern Coastal Plain Patch Prairie | occurs further north on the coastal plain, and *Serenoa repens* is not a component or not characteristic. |

Similar NVC Types General Comments [optional]: This macrogroup (M162) is distinct by physiognomic and floristic factors and is limited to the Florida Peninsula and southeast Georgia. In ~Longleaf Pine Woodland Macrogroup (M007)$$, ~Sand Pine Scrub Forest & Open Woodland Group (G008)$$ has an open tree canopy of *Pinus clausa*, and ~Mesic Longleaf Pine Flatwoods - Spodosol Woodland Group (G596)$$ has an open tree canopy of *Pinus palustris* or *Pinus elliottii var. densa* but *Serenoa repens* and *Aristida beyrichiana* may be dominant understory plants. ~South Atlantic & Gulf Coastal Dune & Grassland Group (G494)$$, in ~Eastern North American Coastal Dune & Grassland Macrogroup (M057)$$, is limited to coastal areas and has low cover of *Serenoa repens, Quercus myrtifolia*, or *Aristida beyrichiana*.

VEGETATION

Physiognomy and Structure Summary: These generally are open and essentially treeless areas, dominated by evergreen shrubs and perennial grasses. Shrubs can have very high cover in scrub sites. Thus, whereas in dry prairie sites *Serenoa repens* shrubs tend to be <0.5 m tall, in scrub sites, the shrubs can be 2-3 m tall. The height of the shrubs depends on the species present and the time since last fire.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: These open prairies and shrublands are codominated by *Aristida beyrichiana, Ceratiola ericoides, Quercus geminata, Quercus myrtifolia*, or *Serenoa repens*. Dry prairie sites are generally open shrubby grasslands. They are essentially treeless areas dominated by *Serenoa repens* and low shrubs, such as *Bejaria racemosa, Ilex glabra, Lyonia fruticosa, Lyonia lucida, Quercus minima, Vaccinium darrowii*, and *Vaccinium myrsinites*, as well as a variety of grasses, such as *Andropogon ternarius, Aristida beyrichiana, Aristida spiciformis, Dichanthelium dichotomum var. ensifolium, Dichanthelium strigosum, Paspalum setaceum, Schizachyrium scoparium var. stoloniferum, Sorghastrum secundum*, and others (Huffman and Judd 1998). In scrub sites *Ceratiola ericoides, Licania michauxii, Lyonia ferruginea, Quercus chapmanii, Quercus geminata, Quercus inopina, Quercus myrtifolia*, and *Serenoa repens* are the most important shrub species. Herbaceous ground cover is sparse in scrub sites but typically includes *Rhynchospora megalocarpa, Andropogon floridanus*, and a variety of lichens (*Cladonia* species). There are a number of endemic plant species which may occur in inland Florida scrubs, including at least 13 Federally listed threatened or endangered species; many of the rarest scrub species are found only in the Lake Wales region.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
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Dynamics: These habitats are maintained by frequent fire, flooding during the growing season, and disturbance from hurricanes, such as very high winds and storm surge in coastal scrub. The frequency of fire is higher in dry prairie than in scrub or in the flatwoods that occur in the vicinity of dry prairies (Platt et al. 2006a). Flooding for short durations is common during the growing season in dry prairie, but most scrubs are not prone to flooding, as they generally occur on deep dry sandy uplands. Due to lack of fire, the replacement of dry prairies by oak palmetto stands has been well-documented at Myakka River State Park (Huffman and Blanchard 1990). Many of the graminoids and shrubs which occur in these habitats resprout following fire, however patches of *Ceratiola ericoides* may not survive if burned more than once in 20 years (Johnson 1982). In the sustained absence of fire, smaller shrubs and herbs may be lost as a consequence of increasing dominance of oak stems (Menges et al. 1993). Many scrub fires burn heterogeneously with resulting patches of unburned fuels, especially in the most xeric types like *Ceratiola ericoides* scrub (Menges 1994).

ENVIRONMENT

Environmental Description: Examples of dry prairie occur on flat, low-lying terrain over moderately to poorly drained soils with sandy surfaces overlying organic hardpans or clayey subsoil (FNAI 1990, Platt et al. 2006a). *Climate:* The climate is subtropical, characterized by hot, wet summers and mild, dry winters. Annual rainfall is about 127 cm and occurs mostly in June through September. *Soil/substrate/hydrology:* These dry prairies occur on flat, moderately to poorly drained sandy sites. These areas are seldom inundated but may flood with several centimeters of water for short periods in spring or after heavy summer rains. The normal water table is several centimeters (in summer and fall) to several meters (in winter and spring) below the ground surface (Duever and Brinson 1984a, Abrahamson and Hartnett 1990, Hardin 1990, Platt et al. 2006a). Soils consist of 0.1-0.9 m of undifferentiated quartz sand with a spodic horizon or clayey subsoil 30-107 cm below the surface. These acidic, nutrient-poor sands have few weatherable minerals and low clay nutrients in the surface soil (Abrahamson and Hartnett 1990). Soils supporting these sparse shrublands are classified as Arenic Haplaquods and include such series as Smyrna; types are Myakka (sandy, siliceous, hyperthermic Aeric Alaquod), Wabasso (sandy, siliceous, hyperthermic Alfic Alaquod), Oldsmar (sandy, siliceous, hyperthermic Alfic Arenic Alaquod), Immokalee (sandy, siliceous, hyperthermic Arenic Alaquod), Leon, Adamsville, and Keri sands (Moore and Swindel 1981, Duever and Brinson 1984a).

Examples of scrub are restricted to a sequence of north/south-trending sand ridges, ancient dunefields, and former shorelines in the Florida Peninsula and to a lesser extent, southeastern Georgia. The largest inland scrub is found in two primary areas, essentially isolated from one another. The so called "Big Scrub" of the Ocala National Forest is the largest expanse of this group, with a somewhat smaller, more southerly area associated with the Lake Wales Ridge. *Climate:* The climate is humid warm temperate. The area of central Florida has a very high number of lightning strikes. *Soil/substrate/hydrology:* According to Myers (1990), inland scrub occurs on Quartzipsamments which are excessively well-drained, nearly pure siliceous sands low in nutrients. Although all scrub soils are Entisols, there is considerable variation in soil color. This color variation appears to be related to the amount of leaching which has taken place, and appears to be related to the amount of time a site has been occupied by scrub vegetation. Excessive leaching, due to inferred long occupation by scrub vegetation, is believed to bleach upper soil horizons and develop pure white soils (such as the St. Lucie series), while moderate leaching, due to shorter occupation by scrub, contributes to less bleaching and consequently more yellow-colored soils (Paola and Orsino series).

DISTRIBUTION

\*Geographic Range: This macrogroup occurs in the Florida Peninsula (north of the Everglades and Big Cypress area) and southeast Georgia. Xeric scrub is found on the Lake Wales Ridge, on coastal sand ridges and on ridges along the north and east sides of coastal plain rivers. Dry prairie is found on the plains near the Myakka River, Kissimmee River, as well as north of Lake Okeechobee and near Fisheating Creek (west of Lake Okeechobee).

Nations: US

States/Provinces: FL, GA

USFS Ecoregions (2007) [optional]: 232D:CC, 232G:CC, 232K:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G177 | Florida Xeric Scrub |
| G176 | Florida Dry Prairie |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Dry Prairie | Huffman and Judd 1998 |  |
| < | Dry Prairie | Abrahamson and Hartnett 1990 |  |
| < | Oak-Saw Palmetto Scrub | Schmalzer and Hinkle 1992b |  |
| < | Palmetto Prairie (*Serenoa - Aristida*) | Küchler 1964 |  |
| >< | Sand Pine Scrub (*Pinus - Quercus*) | Küchler 1964 | M162 does not include scrub vegetation with *Pinus clausa* canopy, only shrublands lacking canopy trees |
| >< | Scrub | Myers 1990a | M162 does not include scrub vegetation with *Pinus clausa* canopy, only shrublands lacking canopy trees |
| >< | Scrubby Flatwoods | Abrahamson and Hartnett 1990 | M162 does not include scrubby flatwoods vegetation with *Pinus* spp. canopy, only shrublands lacking canopy trees |
| < | Scrubby Flatwoods | Abrahamson et al. 1984 |  |
| >< | Scrubby Flatwoods | Huffman and Judd 1998 | M162 does not include scrubby flatwoods vegetation with *Pinus* spp. canopy, only shrublands lacking canopy trees |
| < | Southern Scrub Oak 72, "scrubby flatwoods" variant | Eyre 1980 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C.W. Nordman

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.2.Nh. Southeastern North American Grassland & Shrubland

M309. Southeastern Coastal Plain Patch Prairie

Type Concept Sentence: This vegetation group encompasses the medium-scale perennial grassland, "barrens" and prairie-like vegetation of the inner coastal plains of the southeastern United States, including the Atlantic and Gulf coastal plains from Georgia to Texas, and the intervening Mississippi River Alluvial Plain of Arkansas.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nh. Southeastern North American Grassland & Shrubland (D102)

Elcode: M309

\*Scientific Name: Southeastern Coastal Plain Patch Prairie Macrogroup

\*Common (Translated Scientific) Name: Southeastern Coastal Plain Patch Prairie Macrogroup

\*Colloquial Name: Southeastern Coastal Plain Patch Prairie

\*Type Concept: This vegetation group encompasses the medium-scale grassland, "barrens" and prairie-like vegetation of the inner coastal plains of the southeastern United States, including the Atlantic and Gulf coastal plains from Georgia to Texas, and the intervening Mississippi River Alluvial Plain of Arkansas. These communities are dominated by perennial grasses, with some scattered trees and shrubs, particularly in examples which have not experienced recent disturbance. High-quality examples would support a dense herbaceous layer dominated by tall grasses such as *Sorghastrum nutans* and *Schizachyrium scoparium*. Other frequent graminoid taxa include *Andropogon glomeratus, Andropogon virginicus, Bouteloua curtipendula, Carex cherokeensis, Paspalum floridanum*, and *Schizachyrium scoparium*. In depressions and drainages, *Andropogon gerardii* and/or *Panicum virgatum* will have greater importance and *Tripsacum dactyloides* may be present. At this more mesic end of the continuum, woody plant succession may occur at a more rapid rate than in drier areas.

The most extensive and noteworthy examples of this grassland vegetation are known from specific areas where particular substrates or specific edaphic conditions favor its development and maintenance. This includes the chalky Cretaceous "Black Belt" of Alabama and Mississippi (and related areas in Georgia), calcareous or saline clay-influenced areas of the Gulf coastal plains of Louisiana and Texas, and silty or loess-influenced plains of western Tennessee, Arkansas, Oklahoma, and Mississippi. These are all Cretaceous and younger substrates, in contrast to prairie-like vegetation on older (e.g., Mississippian) limestones in the Interior Low Plateau. In the presettlement landscape and throughout the nineteenth century, the combination of grazing (first by native ungulates and then by free-ranging cattle into the mid-twentieth century) and fire (from lightning and/or Native Americans), combined with the unusual edaphic conditions, kept these areas relatively free of woody vegetation. Many current stands suffer from a lack of disturbance that would inhibit woody plant succession. With range enclosure and an increasing lack of fire during the twentieth century, the dynamics of the landscape have changed, and the coverage of fire-intolerant woody species has increased. This grassland vegetation is now reduced to patches, or its flora persists in pastures which are under more continuous grazing pressure than the former processes would have allowed.

\*Diagnostic Characteristics: These are perennial grasslands of the coastal plains, found on a variety of soil types, many of which have unusual edaphic features (e.g., droughtiness, impeded drainage, salinity). The primary dominant grasses in examples of this macrogroup include *Schizachyrium scoparium* and *Sorghastrum nutans*, as well as *Andropogon virginicus, Panicum* spp., and *Sporobolus* spp. Other more mesic grasses, including *Andropogon gerardii, Tripsacum dactyloides*, and *Panicum virgatum*, are found in mesic and wet phases. These dominant species are wide-ranging and their distributions are not restricted to the coastal plains. *Andropogon glomeratus* is listed as a nominal as an indicator of a southern coastal plain affinity. There are some plant species with more southern affinities that are present in some associations, including *Allium canadense var. mobilense, Packera tampicana, Marshallia caespitosa*, and *Nemastylis geminiflora*, but most of the component species are either widespread of have western affinities. Some proposed factors which have functioned to maintain the openness of these vegetation types include the distinctive soils and resulting stresses to vegetation, as well as fire and grazing.

\*Classification Comments: This macrogroup concept is preliminary and needs further review. It includes a variety of grassland associations ranging from relatively dry to wet-mesic, occurring in a variety of areas across the inner coastal plains physiographic province.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M162 | Florida Peninsula Scrub & Herb |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This vegetation is primarily dominated by perennial grasses, but some examples may have scattered to patchy trees and shrubs, depending on management or time since last fire. Most examples occur on circumneutral soils, or other unusual substrates (e.g., clay, gravels, etc.).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The typical perennial grasses that dominate examples of this vegetation include *Andropogon gerardii, Schizachyrium scoparium*, and *Sorghastrum nutans*. In addition, *Andropogon glomeratus* will be present in many examples, this grass has a more southern distribution relative to the others and serves as a somewhat geographically diagnostic species. Moist to wetter swales or zones may be embedded within and among the typical stands; in these areas, *Andropogon gerardii* and/or *Panicum virgatum* will have greater importance (DeSelm and Murdock 1993), and *Tripsacum dactyloides* may be present. Other plants in stands of this group vary across this broad region. There are several subregional types and variability among these which is expressed in the associations. Typical trees (whose cover may be sparse) include *Carya illinoinensis, Carya myristiciformis, Juniperus virginiana var. virginiana, Maclura pomifera* (within its native range), *Quercus muehlenbergii, Quercus shumardii, Quercus pagoda, Quercus sinuata*, and *Quercus stellata*. In the Jackson Purchase barrens, *Quercus marilandica, Quercus stellata*, and *Quercus velutina* are among the most frequent trees (Bryant and Martin 1988). Some typical shrubs and small trees include *Cercis canadensis var. canadensis, Crataegus* spp., *Diospyros virginiana, Forestiera ligustrina, Frangula caroliniana, Ilex decidua, Prunus angustifolia, Rhus aromatica, Rhus copallinum, Rosa setigera, Sideroxylon lycioides, Symphoricarpos orbiculatus*, and *Ulmus alata*. Other grasses and graminoids may include *Bouteloua curtipendula, Carex cherokeensis, Carex microdonta, Fimbristylis puberula var. puberula, Leersia virginica, Muhlenbergia capillaris, Panicum anceps, Panicum flexile*, and *Sporobolus compositus*. Forbs (which vary across the broad geographic range) may include widespread taxa such as *Desmodium ciliare, Echinacea pallida, Echinacea purpurea, Liatris aspera, Liatris squarrosa, Liatris squarrulosa, Lythrum alatum, Manfreda virginica, Ratibida pinnata, Silphium integrifolium, Silphium laciniatum, Silphium terebinthinaceum, Silphium trifoliatum var. latifolium, Solidago auriculata, Symphyotrichum dumosum (= Aster dumosus), Symphyotrichum patens (= Aster patens)*, and *Symphyotrichum lanceolatum var. lanceolatum (= Aster lanceolatus)*. Some plant species with more southern affinities that are present in some associations include *Allium canadense var. mobilense, Packera tampicana, Marshallia caespitosa*, and *Nemastylis geminiflora*. Some taxa of western affinities that may be present include *Acacia angustissima, Dalea candida, Dalea compacta var. compacta, Dalea purpurea, Desmanthus illinoensis, Dracopis amplexicaulis, Euphorbia bicolor, Eustoma exaltatum ssp. russellianum (= Eustoma russellianum), Grindelia lanceolata, Indigofera miniata (= Indigofera miniata var. leptosepala), Neptunia lutea, Onosmodium bejariense var. occidentale (= Onosmodium occidentale), Palafoxia reverchonii, Rudbeckia missouriensis, Stenosiphon linifolius, Thelesperma filifolium*, and *Zigadenus nuttallii*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: In western Tennessee and Kentucky (the "Jackson Purchase" or "Jackson Plain" barrens), a number of early reports mentioned extensive prairies and emphasized the importance of annual fires in maintaining these grasslands (Bryant and Martin 1988). Scattered groves of fire-tolerant oaks were likely interspersed among these grasslands (M. Evans pers. comm.). With fire suppression, groves of trees rapidly expanded and largely replaced the prairies. In the Black Belt (and in other areas as well), the presence of *Juniperus virginiana*-dominated zones may represent invasion by this species in the absence of sufficiently frequent or intense fire (DeSelm and Murdock 1993). Fire-return time is variable (and speculative in some cases), but fires were probably frequent (potentially on a two- to five-year return interval), originating from lightning or human ignition origin, and are thought to have occurred in late summer to early autumn prior to European settlement. Under current conditions, individual prairie openings or barrens are small and isolated from one another but were formerly more extensive prior to European settlement, forming a more extensive mosaic of grassland and woodlands under frequent fire regimes. Some proposed factors which have functioned to maintain the openness of this vegetation following the reduction of fire frequency include the droughty soils (with clay, chalk, gravel) and resulting stresses to vegetation, as well as some occasional fire. Fralish et al. (1999) noted that both post oak and chestnut oak woodlands are essentially the result of fire suppression in the barrens and historic savannas. In some areas, where the soils are particularly harsh (droughty, nutrient-poor, and/or rocky), stands may retain an open aspect in the absence of fire. Some of the extant examples are largely dependent on contemporary management regimes.

ENVIRONMENT

Environmental Description: The most extensive and noteworthy examples are known from specific areas where particular substrates or edaphic conditions favor the development and maintenance of this grassland vegetation. This includes the chalky Cretaceous "Black Belt" of Alabama and Mississippi (and related areas in Georgia), calcareous or saline clay-influenced areas of the Gulf coastal plains of Louisiana and Texas, and well-drained, gravelly, thin-soil plains of western Tennessee and Kentucky, as well as related areas in Texas, Arkansas, Oklahoma, and Mississippi. *Climate*: Climate varies somewhat across the coastal plains, but the Black Belt area has an average annual precipitation of 130-140 cm and a frost-free period of 200-250 days.

*Soil/substrate/hydrology*: Examples are found on edaphically distinctive substrates, including the chalky Cretaceous "Black Belt" soils of Alabama and Mississippi (and related areas in Georgia), calcareous or saline clay-influenced areas of the Gulf coastal plains of Louisiana and Texas, and the thin-soil, well-drained, and gravelly plains of western Tennessee, Arkansas, Oklahoma, and Mississippi. The Black Belt region derives its name from the nearly black, rich topsoil that developed over Selma chalk, and has long been noted as a distinct topographic region in the state of Mississippi (Lowe 1921). The Black Belt associations generally occur on Cretaceous-age chalk, marl and calcareous clay. This includes calcareous soils of the Sumter, Binnsville, and Demopolis series, described as beds of marly clay over Selma chalk (including the Demopolis and Mooreville formations). The soils of the Jackson Prairie openings are presently mapped as the Maytag Series, a fine montmorillonitic, thermic Entic Chromudert. This deep, slowly permeable soil has formed in residuum weathered from marl of chalk of the Blackland Prairies (Wieland 1995). The soils of some examples in the Upper West Gulf Coastal Plain of Arkansas, Oklahoma, and Texas include relatively deep soils with circumneutral surface pH, as well as on chalk deposits, and thin soils over limestone outcrops with rock fragments. In Louisiana and Texas, examples are documented from the Fleming geologic formation, but are also known from the Cook Mountain Formation, the Jackson Group, as well as the Morse Clay Calcareous Prairie of the northwestern part of Louisiana and northeastern Texas. The examples in the Jackson Purchase region of Kentucky and adjacent Tennessee are found on soils that are predominantly thin, well-drained, and gravelly. This group likely did not develop on the deeper loess soils of the region. The former barrens were on flat to gently rolling lands just to the dry side of the moisture gradient (Bryant and Held 2001).

DISTRIBUTION

\*Geographic Range: Examples are known from several distinct areas in the coastal plains of the southeastern United States. In particular, these include (but are not limited to) the Jackson Purchase area of western Kentucky (primarily Graves County and parts of Calloway County), extending into limited areas of adjacent Tennessee; a relatively small natural region of the Upper West Gulf Coastal Plain of Arkansas and adjacent Oklahoma; and another relatively small natural region of Louisiana and Texas. The Black Belt Prairie component is primarily restricted to the Black Belt (Subsection 231Ba) (Keys et al. 1995) or Blackland Prairie area (EPA Ecoregion 65a) and Flatwoods/Blackland Prairie Margins area (EPA Ecoregion 65b) of Griffith et al. (2001). This region is primarily in Alabama and Mississippi, ranging north in a depauperate form to southern Tennessee (McNairy County) (DeSelm 1989b). The Jackson Prairie component of this group is found in a relatively small natural region of Mississippi, known as the Jackson Hills Subsection 231Bj of Keys et al. (1995) and the Jackson Prairie Ecoregion 65r of EPA (2004). There is also a recently recognized component found in limited parts of Georgia (e.g., on both sides of the Ocmulgee River on the Fort Valley Plateau of Bleckley, Houston, Peach, and Twiggs counties) (Echols 2007). There are also outlying occurrences southward in the Chunnenuggee Hills and Red Hills (both of these parts of the Southern Hilly Coastal Plain, EPA Ecoregion 65d)), and Buhrstone/Lime Hills (EPA Ecoregion 65q) of southern Alabama (Washington, Wilcox, Monroe, and Clark counties). There are some limited examples in EPA Ecoregion 65i (Fall Line Hills; e.g., Jones Bluff in Alabama). Examples of the Grand Prairie vegetation occur on the oldest land surfaces in the Mississippi River Alluvial Valley and the highest land surface in the river-deposited portions of the ecoregion (Ecoregion 73 of EPA; section 234 of Keys et al. 1995) (T. Foti pers. comm.).

Nations: US

States/Provinces: AL, AR, GA, KY, LA, MS, OK, TN, TX

USFS Ecoregions (2007) [optional]: 231B:CC, 231E:CC, 231H:CC, 232B:CC, 232E:CC, 232F:CC, 234E:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G175 | Southeastern Coastal Plain Patch Prairie |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Black Belt | DeSelm and Murdock 1993 |  |
| < | Grand Prairie | DeSelm and Murdock 1993 |  |
| < | Jackson Prairie | DeSelm and Murdock 1993 |  |
| < | Kentucky Barrens | DeSelm and Murdock 1993 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: H.R. DeSelm and N. Murdock (1993)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.2.Nh. Southeastern North American Grassland & Shrubland

M308. Southern Barrens & Glade

Type Concept Sentence: The glade and barrens vegetation of this macrogroup is found across the coastal plains of the southeastern United States ranging from the inland parts of Texas and adjacent Oklahoma (including the Edwards Plateau, Lampasas Cutplain, and Crosstimbers) east to northern Florida. Examples may have scattered trees, but are dominated by grasses and forbs, including annuals, succulents, and other plants with adaptations to a very dry environment during the growing season.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.2.Nh. Southeastern North American Grassland & Shrubland (D102)

Elcode: M308

\*Scientific Name: *Sporobolus vaginiflorus - Schizachyrium scoparium - Clinopodium* spp. Southern Barrens & Glade Macrogroup

\*Common (Translated Scientific) Name: Poverty Dropseed - Little Bluestem - Calamint species Southern Barrens & Glade Macrogroup

\*Colloquial Name: Southern Barrens & Glade

\*Type Concept: This glade and barrens vegetation is found on various specialized substrates (igneous rock, clay, saline soil, limestone, sandstone) in the coastal plains of the southeastern United States ranging from the inland parts of Texas and adjacent Oklahoma through the coastal plains east to northern Florida. It is currently documented from seven distinct areas with particular substrates, in addition to the central Texas/Oklahoma zone. In inland (non-coastal plain) parts of Texas and adjacent Oklahoma including the Edwards Plateau, Lampasas Cutplain, and Crosstimbers, this vegetation consists of specialized glade communities, frequently dominated by low forbs, annual grasses, and succulents. This vegetation may occur as large to small patches, embedded in a matrix of woodlands, open forests, or perennial grass-dominated prairies. Some characteristic plants in these regions include *Lesquerella gordonii, Lesquerella ovalifolia, Schizachyrium scoparium, Sedum nuttallianum, Sedum pulchellum*, and *Sporobolus vaginiflorus* (*var. ozarkanus* and *var. vaginiflorus*).

The substrates for the more eastern examples include outcrops of marine sediment and glauconitic clays of the Weches Formation in central eastern Texas; the Catahoula geologic formation of eastern Texas and western Louisiana; distinctive, massive outcrops of igneous substrate ("nepheline syenite") in Saline and Pulaski counties, Arkansas; outcrops of indurated sandstone in the Tifton Upland of the Georgia Coastal Plain (Altamaha Grit); sandstone outcrops of Panhandle Florida; limestone outcrops of Panhandle Florida; and soils with high saline content in portions of the coastal plain west of the Mississippi River.

They will each be described separately. Weches glades are a series of small-patch communities which are endemic to San Augustine, Nacogdoches, and Sabine counties, Texas. Characteristic species include *Sedum pulchellum, Clinopodium arkansanum*, and *Sporobolus vaginiflorus*. In addition, the narrowly endemic annuals *Lesquerella pallida* and *Leavenworthia aurea var. texana* may be present. Catahoula barrens of eastern Texas and western Louisiana are a vegetational mosaic ranging from herbaceous-dominated areas on shallow soil and exposed sandstone to deeper soils with open woodland vegetation. Glades on distinctive, massive outcrops of igneous substrate ("nepheline syenite") are found in the upper coastal plain of Arkansas, near the Ouachita Mountains. Some typical dominant grasses include *Aristida purpurascens, Piptochaetium avenaceum, Schizachyrium scoparium*, and *Sporobolus clandestinus*. Altamaha Grit glade vegetation occurs on sandstone in the Tifton Upland of the Georgia coastal plain. Typical herbaceous species are *Allium cuthbertii, Aristida beyrichiana, Bigelowia nuttallii, Coreopsis major, Croton michauxii, Liatris squarrosa, Manfreda virginica, Penstemon dissectus, Schizachyrium tenerum, Phemeranthus teretifolius*, and *Tephrosia virginiana*. A typical dwarf-shrub is *Hypericum lloydii*. Occurrences can be as large as five acres. This community typically occurs in a matrix of longleaf pine woodlands.

Sandstone glades of Panhandle Florida are dominated by *Bigelowia nuttallii*. Other characteristic species include *Eurybia hemispherica* and *Schizachyrium scoparium var. scoparium*.

On the open small-patch limestone/calcareous glades that are endemic to the Panhandle of Florida and adjacent Georgia, the most characteristic dominant herbaceous species is *Schoenus nigricans*. Other characteristic taxa are *Andropogon* sp., *Dichanthelium* spp., *Stenaria nigricans var. nigricans, Helianthus radula*, and *Muhlenbergia capillaris*. Some mesic herbaceous patches dominated by *Aquilegia canadensis* are also included here.

Saline glades or barrens of the West Gulf Coastal Plain of Louisiana, Texas, and Arkansas are associated with high sodium substrates, with patchy vegetation and much bare soil. *Aristida dichotoma* is dominant. There are also related examples in the adjacent Ouachita Mountains of Arkansas; these are also accommodated here, even though this technically extends the range off of the coastal plains.

\*Diagnostic Characteristics: In general, stands of this vegetation are characterized by dominance by low forbs, perennial or annual grasses, and succulents. The most characteristic grasses are *Schizachyrium scoparium, Sporobolus vaginiflorus*, and various species of *Aristida*. The other characteristic species vary greatly across the geographic range and substrate diversity of this macrogroup. Some characteristic genera include *Anemone, Bigelowia, Bouteloua, Clinopodium, Croton, Delphinium, Lesquerella, Oenothera, Opuntia, Sedum*, and *Phemeranthus*. Many of these genera exhibit morphological adaptations to an environment in which very dry conditions prevail during the growing season.

Examples of this macrogroup are distinguished by their physiognomy (as distinct from surrounding forests and woodlands) and their occurrence on edaphically noteworthy substrates in the coastal plains of the southeastern United States. Glades and barrens are naturally heterogeneous in their physiognomy, displaying herbaceous patches interspersed with small trees and shrubs. Prairies in the same or related areas will occur on deeper soils and (under proper management) display a more uniform grassy appearance. In central Texas, these areas are shallow-soil glades on limestones and related substrates, dominated by low forbs, annual grasses, and succulents. There may be intercalated patches of dry upland and seasonally wet (or saturated) vegetation.

\*Classification Comments: The central Texas components of this macrogroup are "carbonate glade and barrens" vegetation. Its members are placed here because they are not comfortably accommodated in either the "northern and central" glades nor in the "southern coastal plain" glades. M308 (formerly Southeastern Coastal Plain Barrens & Glade) has been renamed "Southern Barrens & Glade" to accommodate them; they are placed in the "Comanchian glade and barrens" group. The characteristics of this group may overlap with that of ~Great Plains Cliff, Scree & Rock Vegetation Group (G567)$$, and review is needed to clarify the limits of the two concepts.

This eastern components of this macrogroup represent a number of distinctive associations found in the coastal plains of the southeastern United States which are unified by their presence on the shallow soil of rock outcrops, primarily of circumneutral or alkaline strata or saline soils. Stands are characteristically herbaceous in composition, but may have scattered (to dense) woody plants, depending on management and time since last disturbance (including fire).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M116 | Great Plains Cliff, Scree & Rock Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: In central Texas, these glades are mosaics of patches of low-statured vegetation, including low forbs, annual grasses, and succulents, which may occur at low cover. Some of the dominant taxa (e.g., annual grasses) may not be evident at all times of the year. At some sites, the vegetated areas may be limited to cracks or depressions in the limestone bedrock where soil has developed and accumulated. There may be intercalated patches of dry upland and seasonally wet (or saturated) vegetation. This vegetation occurs as distinct and mappable patches on limestone; however, it also occurs in smaller patches in a mosaic with savanna and woodland vegetation dominated by perennial grasses, shrubs, and trees.

Further east, stands of this macrogroup are heterogeneous assemblages of herbaceous and woody plants, the proportion and distribution depending on disturbance events and management. The soils are thin, rocky, and in some cases, base-rich (circumneutral to alkaline) or saline. The vegetation of saline soils in Arkansas, Louisiana, and Texas forms a mosaic primarily consisting of open herbaceous or shrubby plant communities.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The central Texas (Comanchian) glade vegetation has a strong seasonal aspect and is typically dominated by low forbs, annual grasses, and succulents. Some characteristic plants include *Lesquerella gordonii, Lesquerella ovalifolia, Schizachyrium scoparium, Sedum nuttallianum, Sedum pulchellum*, and *Sporobolus vaginiflorus* (*var. ozarkanus* and *var. vaginiflorus*). In addition, *Nostoc commune* (a cyanobacterium) is also common. In central and western Oklahoma, examples are dominated by members of the genus *Lesquerella*, including *Lesquerella gordonii* and *Lesquerella ovalifolia*. Some associates there include *Bouteloua curtipendula, Bouteloua hirsuta, Croton monanthogynus, Mentzelia oligosperma, Oenothera macrocarpa (= Oenothera missouriensis)*, and *Opuntia humifusa* (Hoagland 2000).

On outcrops of marine sediment and glauconitic clays of the Weches Formation in central eastern Texas, characteristic species include *Clinopodium arkansanum, Sedum pulchellum*, and *Sporobolus vaginiflorus*. Other species include *Allium drummondii, Anemone caroliniana, Arnoglossum plantagineum (= Cacalia plantaginea), Calylophus berlandieri ssp. berlandieri, Camassia scilloides, Chamaesyce nutans (= Euphorbia nutans), Croton monanthogynus, Dalea compacta var. compacta, Eleocharis occulta, Galium virgatum, Ipomopsis rubra, Isoetes butleri, Liatris punctata var. mucronata (= Liatris mucronata), Minuartia drummondii, Onosmodium bejariense var. bejariense, Opuntia* spp., *Saxifraga texana*, and *Thelesperma filifolium*. A scattered shrub layer, including *Cercis canadensis, Cornus drummondii, Juniperus virginiana*, and *Sideroxylon lanuginosum*, may be present on some sites. Rare or highly restricted species typical of this community are the listed endangered *Lesquerella pallida (= Physaria pallida)* and *Leavenworthia aurea var. texana (= Leavenworthia texana)*.

Undisturbed examples of the "Catahoula Barrens" of eastern Texas and western Louisiana are dominated by *Aristida longespica, Bigelowia nuttallii, Croton michauxii (= Crotonopsis linearis), Dalea compacta var. compacta, Krameria lanceolata, Lechea san-sabeana, Selaginella arenicola, Schizachyrium scoparium, Sporobolus silveanus* and *Phemeranthus parviflorus* (Marietta and Nixon 1984). Woodlands include a *Quercus stellata*-dominated overstory grading into *Pinus palustris*-dominated areas. Rare or highly restricted species typical of this community are *Gratiola flava* and *Schoenolirion wrightii*.

Glades and barrens on igneous nepheline syenite in Saline and Pulaski counties, Arkansas, may have open stands of *Quercus stellata*, but trees may be absent. Some typical dominant grasses include *Aristida purpurascens, Piptochaetium avenaceum, Schizachyrium scoparium*, and *Sporobolus clandestinus*. Other herbs may include *Camassia scilloides, Clinopodium arkansanum, Delphinium carolinianum, Sabatia campestris*, and *Phemeranthus calycinus*. Lichens are common on the rocky substrate of some examples.

Altamaha Grit vegetation occurs on outcrops of indurated sandstone in the Tifton Upland of the Georgia Coastal Plain. Scattered trees and shrubs can be rooted in deeper soils or crevices, including *Pinus palustris, Quercus marilandica*, and *Vaccinium arboreum*. Typical herbaceous species are *Allium cuthbertii, Aristida beyrichiana, Bigelowia nuttallii, Coreopsis major, Croton michauxii (= Crotonopsis linearis), Liatris squarrosa, Manfreda virginica, Penstemon dissectus, Schizachyrium tenerum, Phemeranthus teretifolius*, and *Tephrosia virginiana*. A typical dwarf-shrub is *Hypericum lloydii*. Rare or highly restricted species typical of this community are *Cuscuta harperi, Evolvulus sericeus*, and *Penstemon dissectus*.

Sandstone glades of Panhandle Florida are dominated by *Bigelowia nuttallii*. Other characteristic species include *Eurybia hemispherica (= Aster paludosus ssp. hemisphericus)* and *Schizachyrium scoparium var. scoparium*. On the open calcareous glades of the Panhandle of Florida (primarily Gadsden and Jackson counties; also adjacent Decatur County, Georgia), the most characteristic dominant herbaceous species is *Schoenus nigricans*. Other characteristic taxa are *Andropogon* sp., *Dichanthelium* spp., *Stenaria nigricans var. nigricans (= Hedyotis nigricans var. nigricans), Helianthus radula*, and *Muhlenbergia capillaris (= var. capillaris)*. Some additional forbs are *Aristida* spp., *Asclepias viridis, Asclepias viridiflora, Callirhoe papaver, Carex cherokeensis, Delphinium carolinianum ssp. carolinianum, Lepuropetalon spathulatum, Liatris squarrosa, Ponthieva racemosa, Rhynchospora* spp., *Rudbeckia fulgida, Selaginella ludoviciana, Stachys crenata, Solidago discoidea*, and *Symphyotrichum pratense (= Aster sericeus var. microphyllus)*. In addition, *Nostoc commune* is abundant on the exposed limestone. More shaded limestone outcrops are dominated by *Aquilegia canadensis, Arenaria lanuginosa, Asplenium heterochroum, Carex willdenowii, Chaerophyllum tainturieri, Laportea canadensis, Melica mutica, Oxalis* sp., *Pachysandra procumbens, Pilea pumila, Polymnia laevigata, Thelypteris kunthii*, and *Urtica chamaedryoides*.

Saline glades or barrens of the West Gulf Coastal Plain of Louisiana, Texas, and Arkansas are associated with high sodium substrates, with patchy vegetation and much bare soil. *Aristida dichotoma* is dominant; other typical species include *Anemone caroliniana, Aristida dichotoma, Anagallis minima, Bigelowia nuttallii, Callirhoe papaver, Coreopsis tinctoria, Drosera brevifolia, Geocarpon minimum, Hedeoma hispida, Hordeum pusillum, Houstonia micrantha, Houstonia pusilla, Houstonia rosea, Isolepis carinata (= Isolepis koilolepis), Krigia occidentalis, Lepuropetalon spathulatum, Mimosa strigillosa, Neptunia lutea, Minuartia muscorum (= Minuartia muriculata), Nothoscordum bivalve, Oenothera linifolia, Ophioglossum crotalophoroides, Plantago* sp., *Polypremum procumbens, Schizachyrium scoparium var. scoparium, Schoenolirion wrightii, Spergularia echinosperma, Sporobolus pyramidatus, Phemeranthus teretifolius*, and *Tradescantia occidentalis*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: In the Edwards Plateau of Texas, processes controlling succession in this vegetation are unclear; however, erosion likely plays a major role. Erosion may be exacerbated in some situations by removal of biomass through overgrazing. Erosion mediates the occurrence of this group through its effects on soil depth. within this region, there is an environmental gradient from moister representatives in the east to drier ones in the west. In the Weches Glades of Texas, soils are shallow, rocky, and basic. These factors tend to inhibit growth of woody vegetation. Outcrops are seepy and saturated during winter and early spring but become hard and dry in the summer. In the Catahoula Barrens of Texas, seasonal droughtiness, shallow soils, aluminum toxicity, and periodic fires are important factors that influence the composition and structure of the vegetation.

In the nepheline syenite outcrops of Arkansas, the absence of fire has modified the flora at some examples, with the buildup of leaf litter and organic matter eliminating the glade herbaceous flora even from shallow soils and rocky areas. Historically, fire would have prevented the establishment of fire-intolerant tree species, reduced or eliminated the organic surface layer, fostered an open canopy with fewer (and larger) trees, and maintained the grass-dominated glade communities. This vegetation responds well to fire management and removal of *Juniperus*. Similar processes and trends operate in the other examples (Catahoula Barrens, Altamaha Grit, Florida Panhandle sandstone and limestone glades).

ENVIRONMENT

Environmental Description: The most westerly examples are glades and barrens found at xeric sites on limestones and related substrates, including sandy and gravelly soils. In the Edwards Plateau of Texas, this is primarily hard-bedded limestone such as the Edwards Formation, but also soft-bedded limestone strata such as the Glen Rose and Cow Creek formations. *Soil/substrate/hydrology:* Stands are found in xeric sites on limestone rock and related substrates, including sandy and gravelly soils. The vegetation of this group consists of glades and barrens on specific and edaphically unusual substrates in the coastal plains of the southeastern United States. The Weches Formation is a marine mudstone with abundant fossils of shallow-water organisms and contains appreciable arsenic, which becomes bioavailable due to weathering. The Eocene Claiborne Group of the Texas Gulf Coastal Plain contains alternating clay and quartzose sand units. The Weches Formation in the Nacogdoches area, a transgressive phase of the Claiborne Group, consists of about 20 m of fossiliferous green clay present as sand-sized aggregates ("greensand"), many of which are fecal pellets. The clay is Fe-rich and has been variously described as "mixed-layer montmorillonite" or as glauconite (Ledger and Judy 2003). Soils are mapped as Trawick series (Mollic Hapludalfs).

The habitat of the Catahoula Barrens includes shallow soil and exposed sandstone, which tend to an herbaceous-dominated vegetation expression, as well as zones of deeper soils with open woodland vegetation. Examples on nepheline syenite are present only in Saline and Pulaski counties, Arkansas, on distinctive, massive outcrops of igneous substrate. Zonal vegetation communities are present around the outcrops. Interior herbaceous-dominated zones can be mesic to wet as springs and small ephemeral streams flow across the rock outcrops and water pools in flat areas. Deeper, more heavily wooded vegetation develops along the flat or slightly sloping outcrop edges.

The Altamaha Grit, now classified by geologists as the Altamaha Formation, outcrops only in southern Georgia; it presumably extends into South Carolina (Huddlestun 1988) but has either been eroded away or remains buried under soil or other types of rock. In addition there are sandstone glades of Panhandle Florida which are dominated by *Bigelowia nuttallii*.

Small-patch limestone glade and outcrop communities are endemic to the Panhandle of Florida (primarily Gadsden and Jackson counties) and adjacent Decatur County, Georgia. This vegetation includes a range of open limestone outcrops on hillsides and hill crests where soils are either very shallow or absent. This grades into shaded, mesic lower slopes near the floodplain of the Chipola River. The soils and geology of these panhandle Florida limestone examples has been well documented. In Gadsden County, they occur on limestone outcrops of the Miocene Chattahoochee Formation (Rupert 1990) primarily between the 90- and 120-foot contour lines (27-37 m MSL). In Jackson County, they are found primarily on rather soft, chalky Oligocene Marianna Limestone (Moore 1955, H. Means pers. comm. 2007) between the 130- and 150-foot contours (40-46 m MSL). These glades usually occupy areas too small to be distinguished at the scale of county soil survey maps. They may occasionally be shown as rock outcrops within the matrix of the surrounding forest soils. In Gadsden County, these matrix soils are Binnsville soils or Cuthbert, Boswell, and Susquehanna soils on moderate to steep slopes (Thomas et al. 1961b). In Jackson County, the matrix soils are the Oktibbeha variant rock outcrop complex (Duffee et al. 1979).

The saline examples in Arkansas, Louisiana, and Texas occur on soils with high saline content, which in the most extreme examples are generally not conducive to woody plant growth. The vegetation is patchy, with much bare soil.

DISTRIBUTION

\*Geographic Range: The glade and barrens vegetation of this macrogroup is found across coastal plains of the southeastern United States ranging from the inland parts of Texas and adjacent Oklahoma (including the Edwards Plateau, Lampasas Cutplain, and Crosstimbers) east to northern Florida. Specific areas in the eastern part of this range include in a localized region of eastern Texas, primarily in San Augustine, Nacogdoches, and Sabine counties; portions of western Louisiana and eastern Texas; the Upper West Gulf Coastal Plain of Saline and Pulaski counties, Arkansas (on nepheline syenite); and the Panhandle of Florida (primarily Gadsden and Jackson counties and adjacent Decatur County, Georgia). In addition, included here are saline glades and barrens of the coastal plain of Arkansas, Louisiana, and Texas.

Nations: US

States/Provinces: AR, FL, GA, LA, OK, TX

USFS Ecoregions (2007) [optional]: 231E:CC, 232B:CC, 232F:CC, 255A:CC, 255E:CP, 315B:CC, 315C:CC, 315D:CC, 315F:CP, 331B:PP, 332F:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: More information is needed on the Comanchian Barrens & Glade (western) part of this macrogroup. There may be undescribed associations that fit in this concept. There are plots for some of the types in the eastern part of the range, but probably not all. It is a heterogeneous group and could change with peer review.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G584 | Southeastern Coastal Plain Barrens & Glade |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Catahoula Barrens | Bridges and Orzell 1989a |  |
| = | Upland Glade | FNAI 1990 |  |
| ? | Upland Glade, Chalky Limestone Glade subtype | FNAI 1992b |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M. Pyne and J. Teague, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne and J. Teague

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by B. Hoagland, A.S. Weakley, E.L. Bridges, S. Orzell, R. Evans, B. Carr.

Version Date: 15 Oct 2014

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2.B.4. Temperate to Polar Scrub & Herb Coastal Vegetation

Temperate to Polar Scrub & Herb Coastal Vegetation is found in temperate to polar coastal habitats, including beaches, bluffs and dunes, where wind and water are major drivers of the vegetation, across the mid to polar latitudes from 23° to 60-70°N and S latitude, dominated by prostrate perennials on the beach and foredune, and graminoids and scrub on backdunes and bluffs.

2. Shrub & Herb Vegetation

2.B.4.Eh. Pampean Dune & Coastal Grassland & Shrubland

D279. Pampean Dune & Coastal Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.4.Eh. Temperate to Polar Scrub & Herb Coastal Vegetation (F005)

Elcode: D279

\*Scientific Name: Pampean Dune & Coastal Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Pampean Dune & Coastal Grassland & Shrubland Division

\*Colloquial Name: Pampean Dune & Coastal Grassland & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M755 | Atlantic Coast & La Plata Delta Beach & Dune |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.4.Eh. Pampean Dune & Coastal Grassland & Shrubland

M755. Atlantic Coast & La Plata Delta Beach & Dune

Type Concept Sentence: Psammophilous plant communities of coastal dunes extending a few kilometers inland and along the littoral of Rio de la Plata and the maritime coasts of Argentina and Uruguay. These sands are carried inland by the wind and then colonized by vegetation. The dunes closer to the ocean are colonized by *Spartina coarctata* and *Panicum racemosum*. *Androtrichum trigynum* and *Tessaria absinthioides* are typical of the wet interdune depressions, while the grassland association of *Poa lanuginosa* and *Adesmia incana* is indicative of stabilized dunes. In Uruguay, where there is a system of coastal lagoons behind the dunes, the shores have a layer of woody plants dominated by *Colletia paradoxa, Ephedra twediana, Lithraea brasiliensis, Rapanea laetevirens*, and *Scutia buxifolia*

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.4.Eh. Pampean Dune & Coastal Grassland & Shrubland (D279)

Elcode: M755

\*Scientific Name: Atlantic Coast & La Plata Delta Beach & Dune Macrogroup

\*Common (Translated Scientific) Name: Atlantic Coast & La Plata Delta Beach & Dune Macrogroup

\*Colloquial Name: Atlantic Coast & La Plata Delta Beach & Dune

\*Type Concept: Psammophilous plant communities of coastal dunes extending a few kilometers inland and along the littoral of Rio de la Plata and the maritime coasts of Argentina and Uruguay. These are littoral sands carried inland by the wind and then colonized by vegetation. Given this dynamic, there are four stages of dune formation until it is stabilized by vegetation cover. Here the dunes closer to the ocean are colonized by *Spartina coarctata* and *Panicum racemosum*. *Androtrichum trigynum* and *Tessaria absinthioides* are typical of the wet interdune depressions, while the grassland association of *Poa lanuginosa* and *Adesmia incana* is indicative of a completely stabilized dune. In Uruguay, where there is a well-developed system of coastal lagoons behind the dunes, the shores have a layer of woody plants dominated by *Rapanea laetevirens, Lithraea brasiliensis, Colletia paradoxa, Ephedra twediana*, and *Scutia buxifolia*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.4.Ej. Patagonian Dune & Coastal Grassland & Shrubland

D281. Patagonian Dune & Coastal Grassland & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.4.Ej. Temperate to Polar Scrub & Herb Coastal Vegetation (F005)

Elcode: D281

\*Scientific Name: Patagonian Dune & Coastal Grassland & Shrubland Division

\*Common (Translated Scientific) Name: Patagonian Dune & Coastal Grassland & Shrubland Division

\*Colloquial Name: Patagonian Dune & Coastal Grassland & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M757 | Patagonian Coastal Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.4.Ej. Patagonian Dune & Coastal Grassland & Shrubland

M757. Patagonian Coastal Grassland & Shrubland

Type Concept Sentence: Includes two types of vegetation: steppe located in the Peninsula de Valdes and the littoral communities covering the dunes. The steppe vegetation is dominated by *Chuquiraga avellanedae*, forming "cushions" 0.5-1.5 m tall and represents an ecotone between the Monte and the Patagonia floristic regions. The steppe alternates with psammophilous grasslands also dominating the coastal dunes and formed by *Spartina longispica* and *Spartina densiflora*. *Sarcocornia perennis* and *Suaeda divaricata* occupy the upper positions of the dunes.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.4.Ej. Patagonian Dune & Coastal Grassland & Shrubland (D281)

Elcode: M757

\*Scientific Name: Patagonian Coastal Grassland & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Patagonian Coastal Grassland & Shrubland Macrogroup

\*Colloquial Name: Patagonian Coastal Grassland & Shrubland

\*Type Concept: This macrogroup is formed by two types of vegetation: the steppe located in the Valdes Peninsula and the littoral communities covering the dunes. The steppe vegetation is dominated by *Chuquiraga avellanedae* forming "cushions" 0.5-1.5 m tall and represents an ecotone between the Monte and the Patagonia floristic regions. The steppe alternates with psammophilous grasslands also dominating the coastal dunes and formed by *Spartina longispica* and *Spartina densiflora*. *Sarcocornia perennis (= Sarcocornia ambigua)* and *Suaeda divaricata* occupy the upper positions of the dunes.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.B.4.Na. Eastern North American Coastal Scrub & Herb Vegetation

D026. Eastern North American Coastal Scrub & Herb Vegetation

Type Concept Sentence: This division is comprised of shrub and herbaceous upland vegetation growing on rapidly drained sandy and, occasionally, rocky substrates along the immediate coasts of the Great Lakes, the Gulf of Saint Lawrence, the Atlantic Ocean, the Gulf of Mexico, Lake Champlain, and possibly other large lakes in eastern North America, and that is subjected to maritime processes of wave disturbance, constant wind, freezing spray, and/or salt spray.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.4.Na. Temperate to Polar Scrub & Herb Coastal Vegetation (F005)

Elcode: D026

\*Scientific Name: *Morella pensylvanica / Ammophila breviligulata - Cakile edentula ssp. edentula* Coastal Scrub & Herb Vegetation Division

\*Common (Translated Scientific) Name: Northern Bayberry / American Beachgrass - American Searocket Coastal Scrub & Herb Vegetation Division

\*Colloquial Name: Eastern North American Coastal Scrub & Herb Vegetation

\*Type Concept: This division is comprised of shrub and herbaceous upland vegetation growing on rapidly drained sandy and, occasionally, rocky substrates along the immediate coasts of the Great Lakes, the Gulf of Saint Lawrence, the Atlantic Ocean, the Gulf of Mexico, Lake Champlain, and possibly other large lakes in eastern North America. Stands occur on sites subjected to maritime processes of wave disturbance, constant wind, freezing spray, and/or salt spray. Settings include sandy to rocky upper beaches, foredunes, backdunes, rocky headlands, and sandplains. Species that are moderately to strongly diagnostic of this division include *Ammophila breviligulata, Atriplex cristata, Atriplex glabriuscula var. acadiensis, Atriplex littoralis, Cakile edentula ssp. edentula, Cakile lanceolata, Carex silicea, Cenchrus tribuloides, Chamaesyce bombensis, Chamaesyce polygonifolia, Ceratiola ericoides, Chrysoma pauciflosculosa, Corema conradii, Croton punctatus, Helianthemum arenicola, Hudsonia ericoides, Hypericum kalmianum, Iva imbricata, Lathyrus japonicus, Lechea maritima, Ligusticum scoticum, Morella pensylvanica, Oenothera humifusa, Panicum amarum, Paronychia erecta, Paspalum monostachyum, Polygonum glaucum, Prunus maritima, Prunus pumila var. pumila, Schizachyrium littorale, Schizachyrium maritimum, Sesuvium maritimum, Solidago sempervirens, Triplasis purpurea, Uniola paniculata*, and *Yucca aloifolia*. These species are largely strictly coastal species and are adapted to rapidly drained sandy substrates, maritime conditions imposed on local climate, and the impacts of maximum exposure to maritime storms and weather, which include frequent substrate disturbance and stress from wind, freezing spray, and/or salt spray.

\*Diagnostic Characteristics: Vegetation is comprised of shrub and herbaceous upland vegetation growing on rapidly drained sandy and, occasionally, rocky substrates along the temperate oceanic and Great Lakes coasts that is subjected to maritime processes of wave disturbance, constant wind, freezing spray, and/or salt spray. Species that are moderately to strongly diagnostic of this division include *Ammophila breviligulata, Atriplex cristata, Atriplex glabriuscula, Atriplex littoralis, Cakile edentula ssp. edentula, Cakile lanceolata, Carex silicea, Cenchrus tribuloides, Chamaesyce bombensis, Chamaesyce polygonifolia, Ceratiola ericoides, Chrysoma pauciflosculosa, Corema conradii, Croton punctatus, Helianthemum arenicola, Hudsonia ericoides, Hypericum kalmianum, Iva imbricata, Lathyrus japonicus, Lechea maritima, Ligusticum scoticum, Morella pensylvanica, Oenothera humifusa, Panicum amarum, Paronychia erecta, Paspalum monostachyum, Polygonum glaucum, Prunus maritima, Prunus pumila var. pumila, Schizachyrium littorale, Schizachyrium maritimum, Sesuvium maritimum, Solidago sempervirens, Triplasis purpurea, Uniola paniculata*, and *Yucca aloifolia*.

\*Classification Comments: This division is extremely heterogeneous along climatic (and associated biogeographical) gradients, reflecting the azonal nature of this type, though the coastal environment is consistent throughout. The macrogroup level accounts for the strong complex gradient of topography, soils and disturbances that distinguish beaches from dunes, whereas the climatic and biogeographical patterns within these categories are accounted for at the group level. There may be sufficient species turnover throughout the division, especially along a latitudinal gradient, to consider the splitting of this division into northern (cool-temperate) and southern (warm-temperate) units (i.e., elevating some group variation to division level). Analysis of representative floristic data across the entirety of these gradients would be useful in validating the current USNVC treatment or in elucidating a possible need for further adjustments.

In physiognomic and compositional aspects, shrublands of rocky headlands along the North Atlantic coast may be more related to inland shrublands of rocky northern areas (2.B.2.Nc ~Eastern North American Grassland & Shrubland Division (D024)$$) than to coastal (dune) shrublands included in this division.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D254 | Caribbean-Mesoamerican Dune & Coastal Grassland & Shrubland | abuts this division (D026) in southern Florida and, possibly, along the south Texas Gulf Coast. The two divisions share species such as *Batis maritima, Cakile lanceolata, Sesuvium portulacastrum, Sporobolus virginicus*, and *Uniola paniculata*. The former division is distinguished by a predominance of characteristically tropical species, including *Alternanthera maritima, Blutaparon vermiculare, Canavalia rosea, Chamaesyce mesembrianthemifolia, Coccoloba uvifera, Ipomoea pes-caprae, Piscidia piscipula, Pithecellobium keyense, Remirea maritima, Scaevola plumieri*, and *Suriana maritima*. |
| D024 | Eastern North American Grassland & Shrubland | interfaces inland along its entire range with this division. Vegetation of D024 lacks the species assemblages that are unique to the maritime setting, including its exposure to frequent storm disturbance. Some inland sites may be on sandy, rapidly drained sites that have broad floristic similarity to D026, but these stands can be distinguished by the usual absence of species that are strictly or primarily coastal in distribution [see Diagnostic Characteristics]. |
| D102 | Southeastern North American Grassland & Shrubland | interfaces inland along its entire range with this division. Vegetation of D0102 lacks the species assemblages that are unique to the maritime setting, including its exposure to frequent storm disturbance. Some inland sites may be on sandy, rapidly drained sites that have broad floristic similarity to D026, but these stands can be distinguished by the usual absence of species that are strictly or primarily coastal in distribution [see Diagnostic Characteristics]. |
| D146 | Arctic Coastal Scrub & Herb Vegetation | occurs to the north of D026, and the two units share a number of species found in the northern areas of the latter division. Diagnostic criteria for the eastern part of the former division are currently not clear; the boundary between these divisions is in Canada. |
| D034 | North American Atlantic & Gulf Coastal Salt Marsh | Sparsely vegetated upper beach stands of D026 intergrade with sparser (incipient) stands of D034 in the middle to inland side of barrier islands and spits, and the two units share some salt-tolerant ruderal species. Stands that can be assigned to the salt marsh D034 can be distinguished by a greater prevalence of hydrophytic, rather than upland, species, including pioneer individuals of the eventually dominant graminoid species (e.g., *Spartina alterniflora, Distichlis spicata*). |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The cover and structure of vegetation are highly variable across the range of this division, ranging from dense shrub thickets to dense or sparse grasslands to very sparse, often succulent, annual plants.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: There is considerable geographic variation across the latitudinal and inland to oceanic ranges of this division. The primary regions of the taxa listed are given as Great Lakes (GL), North Atlantic (NA) (i.e., approximately Virginia and north), South Atlantic (SA) (approximately North Carolina and south), and Gulf Coast (GC).

Characteristic species of upper beach habitats include *Amaranthus retroflexus* (NA), *Ambrosia artemisiifolia* (all), *Ammophila breviligulata* (GL, NA), *Argentina anserina (= Potentilla anserina)* (GL), *Artemisia campestris ssp. caudata* (GL, NA), *Atriplex cristata (= Atriplex mucronata, = Atriplex arenaria, = Atriplex pentandra*) (NA, SA, GC), *Atriplex glabriuscula var. acadiensis (= Atriplex acadiensis)* (NA), *Atriplex littoralis* (NA), *Atriplex prostrata* (NA, SA), *Batis maritima* (SA, GC), *Bidens* spp. (GL), *Cakile constricta* (SA, GC), *Cakile geniculata* (GC), *Cakile edentula ssp. edentula* (including *var. lacustris*) (all), *Cakile lanceolata* (SA, GC), *Cenchrus tribuloides* (NA, SA, GC), *Chamaesyce bombensis (= Euphorbia bombensis)* (SA, GC), *Chamaesyce polygonifolia (= Euphorbia polygonifolia)* (GL, NA, SA), *Chenopodium album* (all), *Cyperus* spp. (all), *Erechtites hieraciifolius* (NA), *Glaux maritima (= Lysimachia maritima)* (NA), *Heliotropium curassavicum* (SA, GC), *Honckenya peploides ssp. diffusa (= Arenaria peploides)* (NA), *Ipomoea imperati* (SA, GC), *Ipomoea sagittata* (SA, GC), *Lathyrus japonicus* (GL, NA), *Lepidium virginicum* (NA, SA, GC), *Mertensia maritima* (NA), *Panicum amarum var. amarum* (NA, SA, GC), *Polygonum* spp. Section *Persicaria* (GL), *Raphanus raphanistrum* (NA), *Salsola kali ssp. kali (= Salsola caroliniana)* (NA, SA, GC), *Sesuvium maritimum* (SA, GC), *Sesuvium portulacastrum* (SA, GC), *Sisymbrium* spp. (GL, NA), *Spartina patens* (SA, GC), *Sporobolus virginicus* (SA, GC), *Suaeda linearis* (NA, SA, GC), *Triplasis purpurea* (NA, SA, GC), *Vigna luteola* (SA, GC), and *Xanthium strumarium* (NA, SA, GC). *Amaranthus pumilus* (NA, SA) and *Polygonum glaucum* (NA, SA) are somewhat rare, but fairly widely distributed, species.

Characteristic species of foredunes include *Ammophila breviligulata* (GL, NA), *Ammophila champlainensis* (Lake Champlain only), *Andropogon virginicus* (SA, GC), *Artemisia campestris ssp. caudata* (GL, NA), *Artemisia stelleriana* (NA), *Calamovilfa longifolia* (GL), *Cenchrus tribuloides* (NA, SA, GC), *Chamaesyce polygonifolia* (GL, NA, SA), *Croton punctatus* (SA, GC), *Lathyrus japonicus* (GL, NA), *Leymus mollis* (NA), *Morella pensylvanica* (NA), *Oenothera humifusa* (SA, GC), *Panicum amarum var. amarum* (NA, SA, GC), *Physalis walteri (= Physalis maritima)* (SA, GC), *Prunus pumila var. pumila* (GL), *Rosa rugosa* (NA), *Solidago sempervirens* (NA, SA, GC), *Solidago simplex var. gillmanii* (GL), *Strophostyles helvola* (NA, SA, GC), *Triplasis purpurea* (NA, SA, GC), and *Uniola paniculata* (SA, GC).

Characteristic taxa of more stabilized [back]dunes include *Amelanchier canadensis* (NA), *Andropogon gerardii* (all), *Arctostaphylos uva-ursi* (GL, NA), *Aristida tuberculosa* (NA), *Carex pensylvanica* (NA), *Carex silicea* (NA), *Celastrus scandens* (GL), *Ceratiola ericoides* (GC), *Chrysoma pauciflosculosa* (GC), *Commelina erecta* (SA, GC), *Conyza canadensis (= Erigeron canadensis)* (all), *Cyperus grayi* (NA), *Danthonia spicata* (GL, NA), *Deschampsia flexuosa* (GL, NA), *Eustachys petraea* (SA, GC), *Gaillardia pulchella* (SA, GC), *Helianthemum* spp. (= *Crocanthemum* spp.) (NA, SA, GC), *Heterotheca subaxillaris* (SA, GC), *Hudsonia tomentosa* (GL, NA), *Hypericum kalmianum* (GL), *Iva imbricata* (SA, GC), *Juncus arcticus ssp. littoralis (= Juncus balticus)* (GL), *Juniperus communis* (GL, NA), *Juniperus horizontalis* (GL, NA), *Lechea maritima* (NA), *Maianthemum stellatum (= Smilacina stellata)* (GL), *Morella cerifera (= Myrica cerifera)* (SA, GC), *Morella pensylvanica* (NA), *Panicum amarum var. amarulum* (SA, GC), *Muhlenbergia capillaris* (SA, GC), *Opuntia humifusa* (SA, GC), *Opuntia pusilla* (SA, GC), *Panicum virgatum* (all), *Paronychia erecta* (GC), *Paspalum monostachyum* (GC), *Pityopsis falcata (= Chrysopsis falcata, = Heterotheca falcata)* (NA), *Polygonella articulata (= Polygonum articulatum)* (GL, NA), *Prunus maritima* (NA), *Prunus pumila var. pumila* (GL), *Rhus copallinum (= Rhus copallina)* (NA), *Rosa blanda* (GL), *Rosa rugosa* (NA), *Rosa virginiana* (NA), *Rubus flagellaris* (NA, SA), *Salix cordata* (GL), *Salix myricoides (= Salix glaucophylloides)* (GL), *Schizachyrium littorale* (GL?, NA, SA, GC), *Schizachyrium maritimum* (GC), *Schizachyrium scoparium* (all), *Shepherdia canadensis* (GL), *Smilax* spp. (SA, GC), *Solidago simplex var. gillmanii* (GL), *Sorghastrum nutans* (NA, SA, GC), *Spartina patens* (SA, GC), *Toxicodendron radicans* (GL, NA), and *Yucca* spp. (SA, GC). Scattered trees, such as *Juniperus virginiana var. silicicola* (SA, GC), *Pinus banksiana* (GL), *Pinus elliottii* (GC), *Pinus resinosa* (GL), *Pinus rigida* (NA), *Pinus strobus* (GL), *Pinus taeda* (SE, GC), and/or *Thuja occidentalis* (GL) may occur.

Unusual expressions of the more stabilized dunes are sandplain grasslands and heathlands of the southern New England / New York coast (NA). Characteristic species include *Amelanchier nantucketensis, Carex pensylvanica, Corema conradii, Deschampsia flexuosa, Gaylussacia baccata, Hudsonia ericoides, Hudsonia tomentosa, Ionactis linariifolius, Juncus greenei, Liatris scariosa var. novae-angliae (= Liatris novae-angliae), Morella pensylvanica, Schizachyrium scoparium, Sericocarpus linifolius, Symphyotrichum dumosum*, and *Vaccinium angustifolium*.

On rocky headlands of northern New England and Canadian Maritime Provinces (NA), characteristic species include *Achillea millefolium, Alnus incana ssp. rugosa, Amelanchier canadensis, Elymus repens (= Elytrigia repens), Empetrum nigrum, Festuca rubra, Gaylussacia baccata, Ilex mucronata, Juniperus horizontalis, Juniperus communis, Ligusticum scoticum, Maianthemum canadense, Morella pensylvanica, Parthenocissus quinquefolia, Aronia x prunifolia, Aronia melanocarpa, Plantago maritima, Prunus pensylvanica, Pteridium aquilinum var. latiusculum, Rosa virginiana, Rubus allegheniensis, Rubus idaeus ssp. strigosus (= Rubus strigosus), Symphyotrichum novi-belgii, Toxicodendron radicans, Trientalis borealis, Vaccinium angustifolium, Vaccinium vitis-idaea*, and *Viburnum nudum var. cassinoides*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The surface geology of the Atlantic coast south of southern Maine and that of the southern Great Lakes are dominated by sand deposits of Quaternary age that are subjected to continuous littoral processes, including deposition from longshore currents, which results in sandy spits and barrier islands. These features are periodically eroded by storm surges. The resultant cycle keeps the spits and islands relatively in place, but promotes relatively rapid changes in local (stand-scale) substrate. There is a gradient of decreasing disturbance frequency in an inland direction from the shoreline, with upper beaches experiencing relatively frequent disturbance, often at least annually, from water from storm surges. Smaller surges from abnormally high regular tides are more frequent along the North Atlantic coasts, where tidal amplitude is generally greater, but large surges may be more frequent along the South Atlantic and Gulf coasts due to more frequent exposure to hurricanes. The inundation tends to level the terrain, and the frequent disturbance favors relatively sparse or patchy communities of mostly annual plants.

Just inland from this zone, disturbance is less frequent, and incipient dunes begin to grow as wind-transported sand accumulates, beginning mostly around individual pioneer plants. Several rhizomatous perennial grass species that may become established on the upper beach, particularly *Ammophila breviligulata* in the north and *Uniola paniculata* in the south, grow rapidly as sand accumulates. In the absence of storm surge disturbance, dunes grow large enough to obstruct the incursion of all but the largest storm surges, and a foredune community dominated by these species is maintained under conditions of sand substrate being disturbed and deposited by wind. Inland from the foredunes or, as foredunes acquire more plant cover, the increased stabilization from wind disturbance allows less disturbance-tolerant species to colonize and contribute to a denser and more diverse backdune community, often with a more prominent shrub component.

In the glaciated Northeast, where glacial moraine deposits have provided extensive sources of sand, stands may occur well inland as extensive dune fields or "sandplains" (e.g., along the Great Lakes, Long Island and coastal southern New England, Ossipee region of New Hampshire and Maine) and may persist beyond the most active period of shoreline processes. Occasional fire or human use may maintain some of these (Motzkin and Foster 2002). On some barrier islands, grazing of dune grasses by wild horses may affect and even retard the progression of foredune development (De Stoppelaire et al. 2001). North of southern Maine and along the northernmost Great Lakes at the southern edge of the Canadian Shield (the northern shore of Lake Huron and much of Lake Superior), resistant bedrock begins to predominate along the more elevated parts of shorelines, and species that are well-adapted to substrate disturbance become less important.

In all communities and settings in this division, exposure to wind, freezing spray (in the northern latitudes), and salt deposition (along the Atlantic and Gulf coasts) strongly limit the vertical growth of woody vegetation and largely prevent succession to forests. Development of barrier islands and spits, along with the accompanying shoreline stabilizing construction (seawalls, high dunes, jetties) throughout the 20th century has not only usurped much of the habitat of this vegetation, but has also interrupted some of the longshore processes that renew the substrate and cycles of deposition that follow episodic erosion.

ENVIRONMENT

Environmental Description: Along the Atlantic and Gulf coasts south of Maine and along the southern Great Lakes, this vegetation occurs primarily on the seaward/lakeward side of barrier islands and spits. From Maine north and along the shores of the northernmost Great Lakes (the northern shore of Lake Huron and much of Lake Superior), the vegetation occurs in a narrow zone extending inland from just above the normal high tide line, but is wider on exposed headlands.

*Climate:* This vegetation is largely azonal in regard to climate, extending essentially throughout the full temperature range of warm-temperate and cool-temperate climates in eastern North America, from subtropical to sub-boreal. Average annual temperature ranges from at least about 22°C (72°F) (Tampa, FL) to about 4°C (39°F) (Duluth, MN). Since sites are immediately along the shorelines of oceans or large lakes, the climate is somewhat maritime, and winter low temperatures and summer high temperatures are somewhat ameliorated, as compared to nearby inland sites. Precipitation ranges from 100 to 160 cm (39-63 inches) per year along the Atlantic and most of the Gulf coasts, with decreases to about 80 cm (31 inches) per year along the western Great Lakes and south Texas Gulf coast.

*Soils/substrate:* Soils are generally well-drained to excessively drained sands, sometimes embedded within a rocky substrate, with little profile development, low amounts of organic matter, and low cation exchange capacity. Soils are typically classified as Entisols or Inceptisols.

*Biogeography:* This vegetation of this division is largely azonal as to climate and, therefore, biogeographically extensive. It represents a special case of shoreline-induced conditions that are common throughout the full temperature range of warm-temperate and cool-temperate climates in eastern North America, from subtropical to sub-boreal. It occupies the Canadian, Illinoian, Austroriparian, and Floridian provinces of McLaughlin (2007).

DISTRIBUTION

\*Geographic Range: This vegetation ranges from the Canadian Maritime Provinces south along the Atlantic and Gulf coasts to at least Texas. It also occurs along the shorelines of the Great Lakes and along a few other large lakes in the glaciated region (e.g., Lake Champlain, Lake Ossipee area). It almost always occurs within several kilometers of these shorelines.

Nations: CA, MX, US

States/Provinces: AL, CT, DE, FL, GA, IL, IN, LB?, MA, MD, ME, MI, MN, MS, NB?, NC, NF?, NH, NJ, NS, NY, OH, ON, PA, PE?, QC?, RI, SC, TX, VA, VT, WI

USFS Ecoregions (2007) [optional]: 212:C, 221:C, 222:C, 231:C, 232:C, 255:C, 315:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: Relationships of stands of vegetation that is transitional from coastal to inland (including Great lakes to smaller lakes) needs further investigation and better delimitation.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M060 | Eastern North American Coastal Beach & Rocky Shore |
| M057 | Eastern North American Coastal Dune & Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-07-20 | D028 Eastern North American Atlantic Rim Beach Strand Vegetation Division | merged |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Lea and D. Faber-Langendoen, in Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Lea

Acknowledgments [optional]: Much floristic information was provided by Lesley Sneddon, Shannon Menard, Joshua Cohen, Don Faber-Langendoen, Jim Drake, Sue Gawler, Sean Basquill, Milo Pyne, Carmen Josse, Christensen (1988), Cohen et al. (2014), Curtis (1959), Gawler and Cutko (2010), Reschke (1990), Schafale and Weakley (1990), and Sperduto and Kimball (2011).

Version Date: 27 Oct 2015

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2. Shrub & Herb Vegetation

2.B.4.Na. Eastern North American Coastal Scrub & Herb Vegetation

M060. Eastern North American Coastal Beach & Rocky Shore

Type Concept Sentence: This macrogroup encompasses sparse annual vegetation occurring on the irregularly flooded tidal zone of coastal beaches of the Atlantic and Gulf of Mexico coasts of North America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.4.Na. Eastern North American Coastal Scrub & Herb Vegetation (D026)

Elcode: M060

\*Scientific Name: Eastern North American Coastal Beach & Rocky Shore Macrogroup

\*Common (Translated Scientific) Name: Eastern North American Coastal Beach & Rocky Shore Macrogroup

\*Colloquial Name: Eastern North American Coastal Beach & Rocky Shore

\*Type Concept: The coastal beach vegetation of this macrogroup is variable, depending on the amount of exposure to wave and wind action, but on average vegetation cover is sparse and no species can be considered dominant. Characteristic annual or biennial species more-or-less restricted to beach habitats include *Cakile edentula ssp. edentula, Honckenya peploides*, or *Sesuvium portulacastrum*. This macrogroup includes annual-dominated sandy, gravel, or cobble surfaces of upper ocean beaches fronting the ocean or on the sheltered beaches of barrier islands. The tidal regime is characterized by irregular tidal flooding, within the reach of storm tides and extreme lunar tides.

\*Diagnostic Characteristics: Usually sparsely vegetated with annual species, often succulents, occurring above mean high tide on ocean beaches and the baysides of barrier islands. *Cakile edentula* and *Sesuvium portulacastrum* are characteristic and diagnostic. But from the north, ~North American Arctic & Boreal Coast Vegetation Macrogroup (M402)$$ may also extend into this region, and the limits of these two macrogroups needs to be resolved.

\*Classification Comments: The northern limits of this macrogroup are uncertain. It is expected to occur into the Atlantic maritime region of eastern Canada, and may extend northward into the boreal regions of Newfoundland and Labrador.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M057 | Eastern North American Coastal Dune & Grassland |  |
| M402 | North American Arctic Coastal Shore |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Vegetation cover is variable, depending on the amount of exposure to wave and wind action, but on average is sparse. Succulent species are characteristic, and typically low-growing or mat-forming.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: No single species can be considered dominant. Characteristic annual or biennial species more-or-less restricted to beach habitats include *Cakile edentula ssp. edentula*, as well as *Amaranthus retroflexus, Ammophila breviligulata, Atriplex cristata (= Atriplex arenaria), Cenchrus tribuloides, Chamaesyce polygonifolia (= Euphorbia polygonifolia), Chenopodium album, Erechtites hieraciifolius, Honckenya peploides ssp. diffusa (= Arenaria peploides), Salsola kali ssp. kali (= Salsola caroliniana)*, and *Triplasis purpurea*. Other associates in the southern portion of the range include various succulent species, including most characteristically *Atriplex patula, Sesuvium maritimum, Sesuvium portulacastrum*, and *Suaeda linearis*. Other species which may occur are *Cyperus* spp., *Ipomoea imperati, Ipomoea sagittata, Panicum amarum, Spartina patens, Sporobolus virginicus*, and *Vigna luteola*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: This vegetation is maintained at the tension zone between the marine and terrestrial realms and flooded irregularly by storm and neap tides. It is extremely dynamic in nature, and forms at this tension zone as it moves with beach erosion or accretion. The wrack line has seed sources for (re)establishment of plants on the beach, and provides cover for invertebrates and vertebrates using the beach.

ENVIRONMENT

Environmental Description: This vegetation occurs on the baysides and ocean-fronting upper ocean beaches, within the reach of storm tides and extreme lunar tides. The South Atlantic coast part of the range occupies the upper portion of ocean beaches of the microtidal region (barrier islands with coastal geomorphology dominated by hurricane overwash rather than tidal energy). The substrate is bare sand but is often covered with dried algae, driftwood, shells, and other materials deposited by waves.

DISTRIBUTION

\*Geographic Range: This vegetation ranges from the Canadian Maritime Provinces south to the Gulf coast of Florida and possibly Mississippi.

Nations: CA, MX, US

States/Provinces: AL, CT, DE, FL, GA?, LB?, MA, MD, ME, MS?, NB?, NC, NF?, NH, NJ, NS?, NY, PE?, QC?, RI, SC, VA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G661 | South Atlantic & Gulf Coastal Beach |
| G660 | North Atlantic Coastal Beach |
| G793 | Great Lakes Coastal Rocky Shore |
| G764 | Great Lakes Sand Beach |
| G342 | Eastern North American Inland Beach & Rocky Shore |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| ? | *Cakiletum edentula* | Conard 1935 |  |
| ? | Beach community | Johnson 1985b |  |
| ? | Beach community | Hill 1986 |  |
| ? | beach | Higgins et al. 1971 |  |
| ? | beach | Fender 1937 |  |
| ? | beach | McDonnell 1979 |  |
| ? | beach community | Baumann 1978b |  |
| ? | beach vegetation | Moul 1973 |  |
| ? | dune-strand area | Clovis 1968 |  |
| ? | embryo dune | Klotz 1986 |  |
| ? | middle beach | Nichols 1920 |  |
| ? | middle beach | Shreve et al. 1910 |  |
| ? | pioneer beach community | Boule 1979 |  |
| ? | sea-strand vegetation, beach formation | Harshberger 1900 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.W. Harshberger (1900); H.S. Conard (1935)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: L. Sneddon

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.B.4.Na. Eastern North American Coastal Scrub & Herb Vegetation

M057. Eastern North American Coastal Dune & Grassland

Type Concept Sentence: This coastal grassland, shrubland and open vegetation type is found on well-drained to excessively drained sands on dunes and along shorelines around the Great Lakes and along the Atlantic and Gulf coasts, on rocky headlands in the North Atlantic, and sandplains near the New England coast.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.4.Na. Eastern North American Coastal Scrub & Herb Vegetation (D026)

Elcode: M057

\*Scientific Name: *Ammophila breviligulata - Uniola paniculata - Solidago sempervirens* Dune & Grassland Macrogroup

\*Common (Translated Scientific) Name: American Beachgrass - Sea-oats - Seaside Goldenrod Dune & Grassland Macrogroup

\*Colloquial Name: Eastern North American Coastal Dune & Grassland

\*Type Concept: This macrogroup encompasses coastal grasslands and shrublands along the Great Lakes, Lake Champlain, and Atlantic and Gulf coasts, occurring on sandy dunes and beaches along coastal shorelines and barrier islands, as well as on rocky headlands in the North Atlantic. It includes areas ranging from sparsely vegetated to lichen-dominated to grasslands and grassland-shrub complexes depending upon the degree of deposition, erosion, and distance from shore. Species composition varies geographically. Within the Great Lakes region and along the North Atlantic Coast, *Ammophila breviligulata* characterizes most herbaceous stands. *Schizachyrium scoparium* is common in many of these northern (not in Canada) sites as well. Common shrubs include *Arctostaphylos uva-ursi, Hudsonia tomentosa, Juniperus communis*, and *Juniperus horizontalis*. Some examples in the Great Lakes may also have a scattered overstory canopy dominated by *Pinus banksiana, Pinus resinosa*, and/or *Pinus strobus*, and on the Atlantic Coast, *Pinus rigida* or *Pinus taeda*. Along the Atlantic Coast *Morella pensylvanica* shrublands are common, and dwarf-shrubs include *Empetrum nigrum* or, less commonly, *Corema*. *Solidago sempervirens* is typical on Atlantic coastal sites. *Uniola paniculata* is diagnostic within sites along the South Atlantic Coast. *Panicum amarum* occurs on the foredunes, and *Spartina patens* and *Schizachyrium littorale* are common on the older dunes and sand flats. Soils are typically well-drained to excessively drained sands with little to no horizon development, or a thin patchy layer of organic material on rocky headlands. Heavy winds significantly impact these communities which can cause reworking of sand or by slower eolian processes. Sites along the Atlantic Coast are shaped by salt spray, overwash, and very high humidity. Fire suppression in the range of this macrogroup can cause an increase in woody species. Many areas have also been impacted by agriculture and grazing.

\*Diagnostic Characteristics: This vegetation is found on rocky headlands of the North Atlantic Coast, on coastal sandplains, and dynamic sandy dunes along and near shorelines of the Great Lakes, and Atlantic and Gulf coasts. Dunes are characterized by shifting sands and blowouts. The vegetation physiognomy ranges from sparsely vegetated to lichen-dominated to shrub-herb complexes and may contain a scattered coniferous overstory. *Ammophila breviligulata* is common in the Great Lakes and North Atlantic Coast examples and often occurs in conjunction with scattered low shrubs. *Solidago sempervirens* is characteristic on Atlantic coastal sites. In the South Atlantic and Gulf coasts, *Uniola paniculata* is the most common species.

\*Classification Comments: It is not clear to what extent inland sandplains with dune-like characteristics fall here. The term "dune" could be generalized to be "shoreline." The extent of this type inward from the beach can be difficult to define, as dunes become more stable. Coastal grasslands, particularly on limestone, around the Great Lakes may fit here or in ~Laurentian-Acadian Calcareous Scrub & Grassland Macrogroup (M507)$$. Interdunal swales that have the diagnostic features of wetland types are excluded from this macrogroup. In the Canadian Maritimes, not all coastal headlands are rocky or even thin-soiled. In warmer areas, rock precludes tree development, hence the shrubland. In colder areas, trees (and in some cases taller shrubs) are excluded by harsh climatic influences. The soils/environmental setting of this type concept is heavily weighted to dune conditions (S. Basquill pers. comm. 2015).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M507 | Laurentian-Acadian Calcareous Scrub & Grassland | includes coastal grasslands on limestone, some alvar-like, and may overlap with this vegetation, if rocky coastal areas are included. |
| M060 | Eastern North American Coastal Beach & Rocky Shore | includes the tidal vegetation maintained at the tension zone between the marine and terrestrial realms, flooded irregularly by storm and neap tides. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The cover and structure of vegetation are highly variable across the range of this macrogroup. It can range from sparsely to completely vegetated and include lichen-dominated, herb-dominated, shrub-herb complexes, and shrub-dominated areas. Some examples within the Great Lakes and North Atlantic Coast may contain a scattered coniferous overstory.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This macrogroup includes a combination of grasslands, dwarf-shrublands, shrublands and open-treed savannas. On dunes along the Great Lakes and North Atlantic Coast, *Ammophila breviligulata* is the most common grass species (*Leymus mollis* may replace it northward in Newfoundland); *Ammophila champlainensis* is the most common grass on the shore of Lake Champlain. Other common species include *Calamovilfa longifolia, Panicum* spp., and *Schizachyrium scoparium*. In the Great Lakes, low evergreen shrubs such as *Arctostaphylos uva-ursi, Juniperus communis*, and *Juniperus horizontalis* occupy dune crests, dune fields, and also the ground layer in the savanna edge of dunes and sandplains. *Prunus pumila, Salix cordata*, and *Salix myricoides (= Salix glaucophylloides)* may occur, and *Pinus banksiana, Pinus resinosa, Pinus strobus*, and *Thuja occidentalis* often form a scattered overstory canopy. Coastal dunes of the Northeast are characterized by *Carex silicea, Cenchrus tribuloides, Hudsonia tomentosa, Lathyrus japonicus, Morella pensylvanica, Panicum amarum, Panicum virgatum, Polygonella articulata, Schizachyrium littorale, Schizachyrium scoparium*, and *Solidago sempervirens*.

Unusual expressions are sandplain grasslands and heathlands of the southern New England / New York coast. These are areas of graminoid- and shrub-dominated vegetation maintained by the combination of extreme conditions and periodic fire or other disturbance. Developing on acidic, nutrient-poor, and very well-drained soils within a few kilometers of the ocean, they may occur as heathlands, grasslands, or support a patchwork of grass and shrub vegetation. Characteristic species include *Amelanchier nantucketensis, Arctostaphylos uva-ursi, Carex pensylvanica, Corema conradii, Deschampsia flexuosa, Gaylussacia baccata, Hudsonia ericoides, Hudsonia tomentosa, Schizachyrium scoparium*, and *Vaccinium angustifolium*. Human disturbances may be partly responsible for the origins of these grasslands and heathlands (Motzkin and Foster 2002).

On rocky headlands of northern New England and Canadian Maritime Provinces, *Juniperus horizontalis* and *Juniperus communis* may occur, with *Empetrum nigrum, Plantago maritima, Solidago sempervirens*, and *Ligusticum scoticum*. Dwarf heath-grassland is dominated by *Festuca rubra, Aronia melanocarpa (= Photinia melanocarpa), Symphyotrichum novi-belgii, Vaccinium angustifolium, Vaccinium vitis-idaea*, among others. Low coastal shrublands are *Gaylussacia baccata*- or *Gaylussacia dumosa*-dominated. Tall shrublands are dominated by *Alnus incana ssp. rugosa, Ilex mucronata (= Nemopanthus mucronatus), Aronia x prunifolia (= Photinia floribunda), Prunus pensylvanica*, and *Viburnum nudum*. *Gaylussacia baccata* and *Morella pensylvanica* occur in the understory. Common herbs include *Pteridium aquilinum var. latiusculum, Trientalis borealis*, and *Maianthemum canadense* (S. Basquill pers. comm. 2015).

Along the South Atlantic Coast, *Panicum amarum* and *Uniola paniculata* are characteristic on the foredunes, and *Spartina patens (= var. monogyna)* and *Schizachyrium littorale* on the older dunes and sand flats. *Iva imbricata* is a characteristic shrub. Examples along the Gulf Coast contain *Ceratiola ericoides, Chrysoma pauciflosculosa, Helianthemum arenicola, Paronychia erecta*, and *Schizachyrium maritimum*. On the western Gulf Coast, this macrogroup includes ridges dominated by *Schizachyrium littorale* and a mixture of forbs, and swales dominated by *Andropogon gerardii, Muhlenbergia capillaris, Paspalum monostachyum*, and *Sorghastrum nutans*.

Dunes in the northern Great Lakes region, especially Lake Superior, shift in composition. A description is needed.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The environment of this macrogroup is one of the most dynamic in existence for terrestrial vegetation. The dunes are reworked by storms or by more gradual eolian processes that may completely change the local environment in a short time. Many of these sites are fairly early in the process of primary succession on recent surfaces. The sandy sites found in this macrogroup are influenced by wind deposition, including active dune processes of wind-caused "blowouts" and subsequent restabilization. Environmental processes include sand deposition, sand erosion, and stabilization. Along the Atlantic and Gulf coasts, overwash, erosion, and sea spray from storms occur often. Hurricanes and lesser storms significantly alter this vegetation on a regular basis. Vegetation interacts strongly with geologic processes with the presence of grass an important factor in the development of new dunes. Alteration of dynamic processes, such as artificial enhancement of dunes by planting or sand fencing, can have drastic effects on this vegetation, causing large areas to succeed to woody vegetation.

Great Lakes dunes are relatively young, as the Great Lakes were occupied by ice until approximately 16,000 years ago. The dune sands are derived from glacial sediments, including lacustrine and outwash sands and sandy tills. Most of the larger dune complexes are associated with the Lake Nipissing stage of the Great Lakes, when water levels were 7.6 to 9 m (25-30 feet) higher than present-day lake levels (Dorr and Eschman 1970, cited in Kost et al. 2007). These higher lake levels resulted in greater amounts of coastal erosion and dune formation. A combination of water erosion and wind deposition resulted in the formation of Great Lakes coastal dunes. The sand source for the coastal dunes was glacial sediment that was eroded by streams and by waves eroding bluffs along the Great Lakes shoreline. These sediments were then moved along the Great Lakes shoreline by near-shore currents, and then deposited along the shoreline by wave action. Strong winds then carried the sands inland, creating dunes. Blowouts, sand burial and abrasion, excessively well-drained and droughty soils, desiccating winds, and occasional fires maintain open conditions (Kost et al. 2007). Great Lakes dunes have been negatively impacted by residential development.

On dunes in the Northeast, this vegetation has been altered by hardening of shorelines, trampling, off-road vehicle traffic, and residential development. Barrier islands may be heavily grazed by wild horses.

ENVIRONMENT

Environmental Description: This macrogroup occurs on well-drained to excessively well-drained sands near shorelines along the Great Lakes, and Atlantic and Gulf coasts. Sites in the Great Lakes include beaches, embayments, sandplains and dunes, and include the full range of dune types, including foredunes, parallel dunes, parabolic dunes, perched dunes, blowouts, and barrier dunes (Kost et al. 2007). Along the Atlantic and Gulf coasts, sites also occur on coastal strands and barrier islands. Rocky headlands support this vegetation on the North Atlantic Coast. Soils are low in nutrient-holding capacity and have little or no horizon development. Sand movement across dunes, including dunal blowouts, strongly impact this macrogroup. Along the Atlantic and Gulf coasts, salt spray provides a source of nutrients and can strongly impact vegetation patterns.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs along the Great Lakes shores of the United States and Canada ranging from Wisconsin to Ontario and New York and along the Atlantic Coast from the Maritime Provinces to southern Florida and along the Gulf Coast to Texas.

Nations: CA, MX, US

States/Provinces: AL, CT, DE, FL, GA, IL, IN, MA, MD, ME, MI, MN, MS, NC, NH, NJ, NS, NY, OH, ON, PA, RI, SC, TX, VA, VT, WI

USFS Ecoregions (2007) [optional]: 211Db:CCC, 211Ee:CCC, 212Ha:CCC, 212Hf:CCC, 212Hl:CCC, 212J:CC, 212L:CC, 212Ra:CCC, 212Rc:CCC, 212Rd:CCC, 212Re:CCC, 212Sb:CCC, 212Sc:CCC, 212Sn:CCC, 212Sq:CCC, 212Te:CCC, 212Ya:CCC, 212Zc:CPP, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 221An:CCC, 222Ia:CC?, 222Ib:CCP, 222Ie:CCC, 222Ja:CCC, 222Kg:CCC, 222Ua:CCP, 222Uc:CCP, 222Ud:CCC, 222Ue:CCC, 232Ab:CCC, 232C:CC, 232D:CC, 232E:CC, 232Hc:CCC, 232I:CC, 232L:CC, 255D:CC, 315E:CC, 411A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G494 | South Atlantic & Gulf Coastal Dune & Grassland |
| G582 | North Atlantic Coastal Rocky Headland |
| G493 | North Atlantic Coastal Dune & Grassland |
| G089 | Great Lakes Dune |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-05-28 | M306 North American Atlantic Sea Cliff & Outcrop Macrogroup | M306 split & merged with M057 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | *Myrica* thicket | Chrysler 1930 |  |
| >< | Beach Dune | FNAI 1990 |  |
| >< | Coastal Grassland | FNAI 1990 |  |
| < | Coastal Heathland and Sandplain Grassland | Dunwiddie et al. 1996 |  |
| < | Middle beach | Chrysler 1930 |  |
| < | Upper beach | Chrysler 1930 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M.A. Chrysler (1930); H.J. Oosting and W.D. Billings (1942); D.A. Albert (1995b); S.C. Gawler and A. Cutko (2010)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S. Menard, L. Sneddon, J. Cohen, and D. Faber-Langendoen

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by Jim Drake, Sue Gawler and Sean Basquill.

Version Date: 21 May 2015

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2. Shrub & Herb Vegetation

2.B.4.Nb. Pacific North American Coastal Scrub & Herb Vegetation

D027. Pacific North American Coastal Scrub & Herb Vegetation

Type Concept Sentence: This division is comprised of sparsely- to well-vegetated rocky headlands, sea bluffs, beaches and dunes along the Pacific Coast of North America that are dominated by prostrate perennials on the beach and foredune, and by graminoids and scrub on backdunes and bluffs.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.B.4.Nb. Temperate to Polar Scrub & Herb Coastal Vegetation (F005)

Elcode: D027

\*Scientific Name: *Abronia* spp. - *Leymus mollis ssp. mollis - Erigeron glaucus* Pacific North American Coastal Scrub & Herb Vegetation Division

\*Common (Translated Scientific) Name: Sand-verbena species - American Dunegrass - Seaside Fleabane Pacific North American Coastal Scrub & Herb Vegetation Division

\*Colloquial Name: Pacific North American Coastal Scrub & Herb Vegetation

\*Type Concept: This division consists of sparsely- to well-vegetated herbaceous and shrubby vegetation on coastal sandy and cobble-on-sand beaches, beach dunes, sand spits, sea cliffs, scree slopes and rocky bluffs exposed to wind, salt spray and occasional ocean wave action, from the coast of the Aleutian Islands, south through California and into northern Mexico. Herbaceous communities on beaches, spits and nearby dunes are characterized by *Abronia latifolia, Abronia maritima, Artemisia pycnocephala, Atriplex leucophylla, Carex macrocephala, Eriophyllum stoechadifolium, Isocoma menziesii, Leymus mollis ssp. mollis, Honckenya peploides ssp. major, Lathyrus japonicus var. maritimus*, or *Senecio pseudoarnica*. Stabilized backdunes are often dominated by shrub or dwarf-shrub communities with *Empetrum nigrum, Gaultheria shallon, Lupinus chamissonis*, or *Vaccinium ovatum*. Introduced species flourishing on these sites are *Cakile edentula* and *Cakile maritima* (on the beaches) and *Ammophila arenaria* (on dunes). On rocky headlands, sea bluffs and cliffs, the dominant vegetation varies over the latitudinal range. Lichen cover can be high. The vascular vegetation is typically composed of grasses and low shrubs, which are restricted to small cracks in rock, or slight, sheltered depressions. In the north, dominants include *Aruncus dioicus var. acuminatus, Carex macrochaeta, Chamerion latifolium, Deschampsia* spp., *Fragaria chiloensis, Heuchera glabra, Lupinus nootkatensis, Potentilla villosa, Prenanthes alata*, and *Rhodiola rosea*. Coastal bluffs further south, in the Georgia Strait and Puget Sound areas, have *Festuca rubra* as a common dominant with associated species such as *Bromus sitchensis, Grindelia integrifolia, Heuchera micrantha, Juniperus maritima, Plectritis congesta, Sedum* spp., and *Zigadenus venenosus*. Introduced species are often present, e.g., *Aira* spp., *Cynosurus echinatus*, and *Cytisus scoparius*. Coastal bluff-scrub on the California coastal islands has *Artemisia californica, Coreopsis gigantea, Dudleya caespitosa, Dudleya greenei, Eriogonum arborescens, Eriogonum giganteum, Eriogonum grande var. rubescens, Isocoma menziesii, Malacothrix saxatilis var. implicata*, and many others, including many endemic species. The northern Baja and Sonoran coasts of the Gulf of California are typically composed of prostrate shrubs and succulents that can withstand salt spray and saline soils, as well as seasonal drought. Common species include *Amaranthus watsonii, Nicotiana obtusifolia, Ficus* spp., *Hofmeisteria* spp., *Eucnide rupestris, Pleurocoronis laphamioides*, and *Maytenus phyllanthoides*.

\*Diagnostic Characteristics: The herbaceous and shrubby vegetation of this division is restricted to sites immediately adjacent to the Pacific Coast that are exposed to wind, salt spray, and occasional ocean wave action. Sites include beaches, spits, dunes, sea bluffs, sea cliffs and rocky headlands. Total cover varies from very low on beaches, active dunes and rocky headlands, to moderately dense on stabilized dunes and sea bluffs. Graminoid or broad-leaved herbaceous vegetation is most characteristic, but some dwarf-shrub and low-shrub vegetation occurs. On the sandy beaches and dunes, plants are generally rhizomatous or stoloniferous. Strong diagnostic species include salt-tolerant forbs such as *Abronia latifolia, Abronia maritima, Artemisia pycnocephala, Atriplex leucophylla, Dudleya caespitosa, Eriophyllum stoechadifolium, Fragaria chiloensis, Grindelia integrifolia, Isocoma menziesii, Honckenya peploides ssp. major, Lathyrus japonicus var. maritimus, Mertensia maritima, Plectritis congesta*, and *Senecio pseudoarnica*. Grasslands are characterized by *Leymus mollis ssp. mollis, Carex macrocephala, Ericameria ericoides, Eriogonum giganteum*, or *Festuca rubra*. Characteristic shrubs include *Coreopsis gigantea* and *Juniperus maritima*. Salt-tolerant introduced species are common.

\*Classification Comments: The plant species of this division show latitudinal and climatic variation, from the near desert conditions of the Baja, to the Mediterranean climates of California, to the temperate coast of Oregon, Washington, British Columbia, and the boreal transition of Alaska. The northern limit of this division is likely best characterized by the northern boreal and arctic climates where *Honckenya peploides ssp. diffusa* replaces *Honckenya peploides ssp. major*, and *Leymus mollis ssp. villosissimus* replaces *Leymus mollis ssp. mollis*. *Mertensia maritima* occurs throughout the northern boreal and arctic coast, but also runs south along the coast of southeastern Alaska and Haida Gwaii (Queen Charlotte Islands). At the southern end, this division extends to the Viscaino Peninsula in central Baja. South of here, and on the littoral of much of the Sea of Cortez, the vegetation is more truly tropical: there is very little *Abronia* spp. and there are more pan-tropical littoral genera or species such as *Scaevola, Cocos*, or *Ipomoea pes-caprae*, and several species of mangroves. The coastal sand dunes there also have tropical grasses such as *Jouvea pilosa*.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D256 | Tropical Eastern Pacific Dune & Coastal Grassland & Shrubland | includes coastal vegetation in tropical regions to the south of D027. |
| D022 | Western North American Grassland & Shrubland | includes upland grassland and shrubland vegetation further inland from the coastal vegetation of D027. |
| D146 | Arctic Coastal Scrub & Herb Vegetation | includes coastal vegetation in boreal and arctic regions to the north of D027. |
| D031 | Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland | includes freshwater wetland vegetation over the range of D027, but mostly further inland. |
| D035 | Temperate & Boreal Pacific Coastal Salt Marsh | includes salt-tolerant coastal vegetation of the inter-tidal zone (i.e., estuarine vegetation). |
| D052 | Western North American Temperate Cliff, Scree & Rock Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Vegetation is generally comprised of creeping to low-statured perennial grasses, forbs, succulents, or dwarf-shrubs. Plants of beaches and dunes are usually rhizomatous or stoloniferous. Total cover varies from very low on beaches, active dunes and sea cliffs to moderately dense on stabilized dunes and sea bluffs. Lichen or moss cover can be high on sea cliffs and rocky headlands. Dense shrublands can occur on stabilized dunes. Stunted trees can occur, clinging to cliff faces, bluffs and balds exposed to salt spray of the ocean.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The vegetation on beaches, spits and dunes consists of communities of salt-tolerant forbs and grasses. In northern areas, sites are dominated by species such as *Achillea millefolium var. borealis, Carex macrocephala, Cochlearia groenlandica, Honckenya peploides ssp. major, Lathyrus japonicus var. maritimus, Leymus mollis ssp. mollis, Mertensia maritima*, and *Senecio pseudoarnica*. In central and southern areas, the sites are dominated by *Ambrosia chamissonis, Abronia latifolia, Abronia maritima, Atriplex leucophylla, Artemisia pycnocephala, Eriophyllum stoechadifolium, Isocoma menziesii, Lupinus arboreus*, as well as *Leymus mollis ssp. mollis*. Common associates include *Camissonia cheiranthifolia (= Camissoniopsis cheiranthifolia), Ericameria ericoides, Erigeron glaucus, Lupinus arboreus, Lupinus chamissonis, Lupinus littoralis*, and *Polygonum paronychia*. Non-native species can dominate the vegetation in some areas, e.g., *Ammophila arenaria* is a common dune grass; *Cakile edentula* and *Cakile maritima* occur on beaches. Further south, into Baja California, Mexico, sites are composed of *Abronia maritima, Astragalus anemophilus, Atriplex canescens var. linearis, Atriplex julacea, Atriplex magdalenae, Chaenactis lacera, Croton californicus, Encelia ventorum, Euphorbia misera, Frankenia palmeri, Helianthus niveus, Lotus bryantii, Lycium californicum, Lycium brevipes (= Lycium richii), Maytenus phyllanthoides*, and *Suaeda taxifolia*. Dwarf-shrub communities on stabilized dunes are dominated by *Empetrum nigrum, Gaultheria shallon*, or *Vaccinium ovatum*.

Sea bluffs, sea cliffs and rocky headlands are characterized by a mix of forbs, grasses and shrubs. On sea cliffs and headlands, vascular plants establish on ledges and in cracks. Mosses can be abundant on rock bluffs; lichens can dominate rocky headlands and cliffs. The vegetation varies considerably from north to south. On the Alaska Peninsula, common species are *Alnus viridis ssp. sinuata, Aruncus dioicus var. acuminatus, Campanula* spp., *Carex macrochaeta, Chamerion latifolium, Deschampsia* spp., *Fragaria chiloensis, Heuchera glabra, Lupinus nootkatensis, Phegopteris connectilis, Potentilla villosa, Prenanthes alata*, and *Rhodiola rosea*. On Haida Gwaii, *Festuca rubra* is a common dominant of rocky headlands, with associated species including *Achillea millefolium, Conioselinum gmelinii, Fragaria chiloensis, Maianthemum dilatatum, Mimulus guttatus, Plantago maritima, Potentilla villosa*, and stunted *Picea sitchensis*.

Coastal bluffs further south (Georgia Strait and Puget Sound areas) also have *Festuca rubra* but associated species include *Grindelia integrifolia, Heuchera micrantha, Plectritis congesta, Sedum* spp., and *Zigadenus venenosus*. *Juniperus maritima* may also occur. Mosses can be abundant, including *Racomitrium canescens, Polytrichum piliferum*, or *Dicranum* spp. Introduced species are often found, e.g., *Aira* spp., *Cynosurus echinatus*, and *Cytisus scoparius*.

Coastal bluff-scrub on the California coastal islands has species such as *Artemisia californica, Coreopsis gigantea (= Leptosyne gigantea), Dudleya caespitosa, Dudleya greenei, Eriogonum arborescens, Eriogonum giganteum, Eriogonum grande var. rubescens, Isocoma menziesii*, and *Malacothrix saxatilis var. implicata*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Sites are subject to exposure to waves, eroding and desiccating winds, slope failures, and sheet erosion.

ENVIRONMENT

Environmental Description: This division occurs on sandy beaches, spits, dunes, rocky headlands, bluffs and sea cliffs found along the coast, where wind exposure and salinity are major drivers of the vegetation, with occasional wave action playing a role on beaches and spits. The dunes can extend inland from the sea to wherever the wind and sandy/gravelly site conditions restrict tree growth. Although these communities typically occur at low elevations, salt spray from winter storms may affect exposed cliffs at 100-200 m elevation.

*Climate:* Much of the vegetation of this division is influenced by a broadly temperate maritime climate; however, in the south, the climate is Mediterranean.

*Soils/substrate:* Soils of beaches and spits and dunes are usually sandy and well-drained, although some areas may have a cobble layer on top of sand. Rocky headlands, cliffs and sea bluffs generally have thin soils that are limited to fine materials blown into cracks and fissures in the bedrock substrate.

Biogeography: The vegetation of this division does vary over the wide latitudinal range. Cold-temperate, warm-temperate and Mediterranean climates are included, and the floristics differ somewhat in each of these regions. Peinado et al. (2009, cited in Peinado et al. 2011a) have distinguished seven phytogeographical provinces over the range of this division: Aleutian, Sitkan, Oregonian, Northern Californian, Southern Californian, Martirense, and Baja Californian. Peneido et al. (2011a) also assign one of 15 phytogeographical elements to each species in their vegetation tables so it is possible to understand the biogeography of the vegetation units.

DISTRIBUTION

\*Geographic Range: This division occurs along the coastline and islands from the Aleutian Islands south through Alaska's central and southeastern coastline, British Columbia, Washington, Oregon, California and into Mexico to the Viscaino Peninsula.

Nations: CA, MX, US

States/Provinces: AK, BC, CA, MXBC, OR, WA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M753 | Warm Pacific Coastal Beach, Dune & Bluff |
| M059 | Pacific Coastal Beach & Dune |
| M058 | Pacific Coastal Cliff & Bluff |
| M511 | North Pacific Coastal Ruderal Grassland & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Beach and Dune | Barbour et al. 2007a |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M. Peinado, F.M. Ocaña-Peinado, J.L. Aguirre, J. Delgadillo, M.Á. Macías, and G. Díaz-Santiago (2011a)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Meidinger

Acknowledgments [optional]: Gwen Kittel

Version Date: 29 Oct 2015

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Peinado, M., F. M. Ocaña-Peinado, J. L. Aguirre, J. Delgadillo, M. Á. Macías, and G. Díaz-Santiago. 2011a. A phytosociological and phytogeographical survey of the coastal vegetation of western North America: Beach and dune vegetation from Baja California to Alaska. Applied Vegetation Science 14:464-484.

Peinado, M., M. Á. Macías, J. L. Aguirre, and J. Delgadillo. 2009b. Fitogeografía de la costa del Pacífico de Norteamérica. Anales del Jardín Botánico de Madrid 66(2):1-44.

2. Shrub & Herb Vegetation

2.B.4.Nb. Pacific North American Coastal Scrub & Herb Vegetation

M059. Pacific Coastal Beach & Dune

Type Concept Sentence: Coastal beach and active dunes along the temperate Pacific coast of North America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.4.Nb. Pacific North American Coastal Scrub & Herb Vegetation (D027)

Elcode: M059

\*Scientific Name: Pacific Coastal Beach & Dune Macrogroup

\*Common (Translated Scientific) Name: Pacific Coastal Beach & Dune Macrogroup

\*Colloquial Name: Pacific Coastal Beach & Dune

\*Type Concept: This macrogroup consists of herbaceous and shrubby vegetation on temperate coastal sandy and cobble-on-sand beaches, beach dunes, and sand spits. Wetland dune swales are excluded. Herbaceous communities include salt-tolerant forb-dominated types with *Abronia latifolia, Achillea millefolium var. borealis, Cochlearia groenlandica, Equisetum variegatum, Honckenya peploides, Lathyrus japonicus var. maritimus, Mertensia maritima*, and grasslands dominated by *Leymus mollis, Leymus arenarius*, and/or *Festuca rubra*. Dwarf-shrub are dominated by *Empetrum nigrum, Ericameria ericoides, Lupinus chamissonis, Lupinus arboreus, Gaultheria shallon, Vaccinium ovatum, Myrica gale*, or *Salix* spp. Herbaceous species intermixed with dwarf-shrubs include *Lathyrus japonicus var. maritimus, Conioselinum chinense, Cornus suecica*, and *Cnidium cnidiifolium*. This macrogroup occurs along the Pacific coast from Mexico to Alaska, including the Aleutian Islands.

\*Diagnostic Characteristics: This macrogroup is restricted to the immediate sandy coastline and open shrub-herb vegetation on dunes (typically within 2 km) from the coast. These coastal sandy beaches and dunes contain graminoid or broad-leaved herbaceous vegetation up to about 1 m in height, usually rhizomatous or stoloniferous. Total cover varies from very low on beaches and active dunes to moderately dense on stabilized dunes. Characteristic species include salt-tolerant forbs such as *Abronia latifolia, Abronia maritima, Achillea millefolium var. borealis, Artemisia pycnocephala, Calystegia macrostegia, Calystegia soldanella, Camissonia cheiranthifolia, Cochlearia groenlandica, Erigeron glaucus, Equisetum variegatum, Honckenya peploides, Lathyrus littoralis, Malacothrix incana*, and *Mertensia maritima*. Grasslands are dominated by *Leymus mollis, Leymus arenarius*, or *Festuca rubra* and may include *Poa douglasii, Poa eminens, Hordeum brachyantherum*, and *Deschampsia beringensis*, and forbs such as *Achillea millefolium var. borealis, Angelica genuflexa, Angelica lucida, Claytonia sibirica, Fragaria chiloensis, Heracleum maximum, Lathyrus japonicus var. maritimus, Ligusticum scoticum, Lupinus nootkatensis, Polygonum paronychia*, and *Senecio pseudoarnica*. Dwarf-shrub communities are dominated by *Empetrum nigrum, Ericameria ericoides, Lupinus chamissonis, Gaultheria shallon, Vaccinium ovatum, Myrica gale*, or *Salix* species. Herbaceous species intermixed with dwarf-shrubs include *Lathyrus japonicus var. maritimus, Conioselinum chinense, Cornus suecica*, and *Cnidium cnidiifolium*. *Lupinus arboreus* in native stands also are included.

\*Classification Comments: The concept is suggested to extend only in the temperate zone, north of which occurs ~North American Arctic & Boreal Coastal Shore Macrogroup (M402)$$, but it is possible that this macrogroup should include the boreal coast, and M402 should be restricted to the Arctic?

Carmen Cadrin (pers. comm. 2014): I think the description presented in the macrogroup is too broad. Although some British Columbia sites have dune vegetation immediately adjacent to estuarine meadows, I'm not sure they should be lumped together in the same macrogroup. If it must stay as is, I suggest writing up the vegetation types by site characteristics as indicated in Environment and Dynamics sections. See also Review comments form for more details and Mackenzie (2012) for comparison of Terrestrial Realm/Beachland Class and Estuarine Realm.

According to Manuel Peinado (pers. comm. 2014), four macrogroups may need to be split within this macrogroup (in addition to removing the boreal and Arctic vegetation to M402): (1) North Pacific Temperate and Boreal Dune Vegetation (his *Honckenyo-Elymetea arenarii*). 469ff; (2) Californian Dune Vegetation (*Ambrosietea chamissonis*). 472ff; (3) Bajo California - Mesoamerica Tropical Dune Vegetation (*Euphorbio-leucophyllae-Sporoboletea virginici*). 474ff; and (4) Pacific Tidal Beach (*Cakiletea maritimae*). P. 472. Although *Cakile* is exotic in the west, your paper suggests other native components. But this is a challenging type for us, with respect to this macrogroup versus ~North Pacific Coastal Ruderal Grassland & Shrubland Macrogroup (M511)$$.

Manuel Peinado (pers. comm. 2014): The author of ~Pacific Coastal Beach & Dune Macrogroup (M059)$$ and ~Pacific Coastal Cliff & Bluff Macrogroup (M058)$$ has made a substantial synthesis effort, which is much appreciated. This effort is even more outstanding if we consider the extent of the coastal zone examined along with its vast diversity despite only including the vegetation of dunes and beaches. However, unfortunately, I feel that the final result of this great effort does not reflect the concept of the macrogroup as defined by the USNVC (2014):

"A vegetation classification unit of intermediate rank defined by combinations of moderate sets of diagnostic plant species and diagnostic growth forms that reflect biogeographic differences in composition and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes."

As indicated in the publications I cite in this form, along North America's Pacific coast, including the coasts of Mexico (and even those of Mesoamerica), there exists an extensive biogeographic diversity recognized by several classification systems (Takhtajan, Thorne, Cronquist, etc.) that is clearly related to dune and beach vegetation. In addition, neither does the proposal put forward distinguish the clear differences in zonobiomes and climates that arise from the Aleutian islands to the Mexican tropical costs. Thus, on the continental scale, there are at least four macrobioclimates and a similar number of zonobiomes: Boreal, Temperate, Mediterranean and Tropical. These show considerable regional differences reflected in the azonal communities of dunes, beaches and salt marshes. The proposal also lacks consideration of the ecological processes of zonation and succession, which are key to interpreting the vegetation of dunes and beaches and consequently fails to include very characteristic vegetation types such as debris-line communities, herbaceous rhizomatous vegetation on oligotrophic habitats, consolidated dune scrubs, stabilized dune forests, willow shrubs on dune swales and deflation plains, terophytic sand communities and other specialized groups. These factors are reflected in intense changes in these sets of diagnostic plant species and diagnostic growth forms. If you consider it appropriate, I could make a different proposal based on my syntaxonomical scheme (cf. Peinado et al. 2011a).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M044 | Californian Coastal Scrub |  |
| M402 | North American Arctic Coastal Shore |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Vegetation is comprised of creeping to low-statured (up to about 1 m tall) perennial grasses, forbs and dwarf-shrubs. Plants are usually rhizomatous or stoloniferous. Total cover varies from very low on beaches and active dunes to moderately dense on stabilized dunes.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This macrogroup consists of communities of salt-tolerant forbs such as *Abronia latifolia, Abronia maritima, Achillea millefolium var. borealis, Artemisia pycnocephala, Calystegia macrostegia, Calystegia soldanella, Camissonia cheiranthifolia, Cochlearia groenlandica, Erigeron glaucus, Equisetum variegatum, Honckenya peploides, Lathyrus littoralis, Malacothrix incana*, and *Mertensia maritima*. Grasslands are dominated by *Leymus mollis, Leymus arenarius (= Elymus arenarius)*, or *Festuca rubra* and may include *Poa douglasii, Poa eminens, Hordeum brachyantherum*, and *Deschampsia beringensis*, and forbs such as *Achillea millefolium var. borealis, Angelica genuflexa, Angelica lucida, Claytonia sibirica, Fragaria chiloensis, Heracleum maximum, Lathyrus japonicus var. maritimus, Ligusticum scoticum, Lupinus nootkatensis, Polygonum paronychia*, and *Senecio pseudoarnica*. Dwarf-shrub communities are dominated by *Empetrum nigrum, Ericameria ericoides, Lupinus chamissonis, Gaultheria shallon, Vaccinium ovatum, Myrica gale*, or *Salix* species. Herbaceous species intermixed with dwarf-shrubs include *Lathyrus japonicus var. maritimus (= Lathyrus maritimus), Conioselinum chinense, Cornus suecica*, and *Cnidium cnidiifolium*. *Lupinus arboreus* in native stands also are included.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Processes that define this macrogroup include sand deposition, salt spray, wind erosion, long-shore transport, dune formation, and water erosion such as overwash from storm surges. Herbaceous species stabilize the sand deposits (dunes, beaches), and the older deposits support dwarf-shrubs mixed with herbaceous species.

The beach and open (shrub-herb) dune vegetation is but one part of the vegetation on dunes, including debris-line communities, herbaceous rhizomatous vegetation on oligotrophic habitats, consolidated dune scrubs, stabilized dune forests, willow shrubs on dune swales and deflation plains, terophytic sand communities and other specialized groups. The zonal and successional relationships among these communities are complicated and non-linear.

ENVIRONMENT

Environmental Description: This macrogroup occurs on sandy beaches and dunes, with or without salt spray, typically within 2 km of the coast. Soils are usually sandy and well-drained; some areas may have a cobble layer on top of sand. Forb communities are salt-tolerant and tend to occur just above mean high tide, while the grasslands tend to occur on cobble beaches and on dunes that become higher and further away from the beach. On the California Channel Islands, communities can be further interior where sand has been moved >2 km inland from high winds. Dwarf-shrub communities occur on older dunes, usually behind grassland-dominated dunes.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs on the immediate sandy coastline and sand dunes typically within 2 km of the coast, from the Aleutian Islands south along Alaska's central and southeastern coastline (including Kodiak and other islands), British Columbia, Washington, Oregon, California and possibly into Mexico.

Nations: CA, MX?, US

States/Provinces: AK, BC, CA, OR, WA

USFS Ecoregions (2007) [optional]: 242A:CC, M242A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G663 | Californian Coastal Beach & Dune |
| G498 | North Pacific Maritime Dune & Coastal Beach |
| G664 | Warm Pacific Coastal Beach & Dune |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Beach and Dune | Barbour et al. 2007a |  |
| > | III.A.1.a - *Elymus* | Viereck et al. 1992 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: G. Kittel, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel

Acknowledgments [optional]:

Version Date: 29 Mar 2017

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2. Shrub & Herb Vegetation

2.B.4.Nb. Pacific North American Coastal Scrub & Herb Vegetation

M058. Pacific Coastal Cliff & Bluff

Type Concept Sentence: This macrogroup occurs on sea cliffs, scree slopes and rocky coastlines exposed to salt spray and ocean wave action. It occurs from the coast of the Aleutian Islands, south through California and possibly into Mexico.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.B.4.Nb. Pacific North American Coastal Scrub & Herb Vegetation (D027)

Elcode: M058

\*Scientific Name: Pacific Coastal Cliff & Bluff Macrogroup

\*Common (Translated Scientific) Name: Pacific Coastal Cliff & Bluff Macrogroup

\*Colloquial Name: Pacific Coastal Cliff & Bluff

\*Type Concept: This macrogroup occurs from the coast of the Aleutian Islands, south through California and possibly into Mexico. It consists of sparsely to moderately densely vegetated sea cliffs, scree slopes and rocky (but not cobble-on-sand) coastlines exposed to salt spray and ocean wave action. The vascular vegetation is typically composed of grasses and low shrubs, which are restricted to small cracks in rock, or slight, sheltered depressions. Lichen cover can be high. In the north, dominants include *Aruncus dioicus var. acuminatus, Campanula* spp., *Carex macrochaeta, Chamerion latifolium, Chamerion latifolium, Deschampsia* spp., *Fragaria chiloensis, Heuchera glabra, Lupinus nootkatensis, Phegopteris connectilis, Potentilla villosa, Prenanthes alata*, and *Rhodiola rosea*. On Haida Gwaii, *Festuca rubra* (native subspecies) is a common dominant of rocky headlands. Associated species include *Achillea millefolium, Conioselinum gmelinii, Fragaria chiloensis, Maianthemum dilatatum, Mimulus guttatus, Plantago maritima*, and *Potentilla villosa*. However, a wide range of other species may occur and may be dominant in some cases. *Picea sitchensis* tolerates salt spray and often occupies appropriate microsites on the rocky headlands. They are generally characterized by stunted growth, usually with branches from top to bottom of bole. Lichen cover can be high, but species are poorly described. Coastal bluffs further south, in the Georgia Strait and Puget Sound areas, also have *Festuca rubra* as a common dominant but associated species include *Bromus sitchensis, Grindelia integrifolia, Heuchera micrantha, Plectritis congesta, Sedum* spp., and *Zigadenus venenosus*, among others. Trees, if present, are stunted and/or windblown and may include *Arbutus menziesii, Quercus garryana*, or *Pseudotsuga menziesii*. *Juniperus maritima* may also occur. Shrubs are also infrequent and may include *Holodiscus discolor, Amelanchier alnifolia*, or *Mahonia aquifolium*. Mosses can be abundant, including species such as *Racomitrium canescens, Polytrichum piliferum*, or *Dicranum* spp. Introduced species are often found, e.g., *Aira* spp., *Cynosurus echinatus*, and *Cytisus scoparius*. Coastal bluff-scrub on the California coastal islands has *Artemisia californica, Coreopsis gigantea, Dudleya caespitosa, Dudleya greenei, Eriogonum arborescens, Eriogonum giganteum, Eriogonum grande var. rubescens, Isocoma menziesii, Malacothrix saxatilis var. implicata*, and many other species, including many endemic species. This types includes rocky headlands and sea cliffs. Frequent exposure to salt spray distinguishes this macrogroup from inland and alpine rock outcrops and cliffs. Substrates include glacial deposits along the Pacific Ocean. Exposure to waves, eroding and desiccating winds, slope failures, and sheet erosion create rocky substrates that are often unstable. Soils are thin and limited to fine materials blown into cracks and fissures in the bedrock substrate.

\*Diagnostic Characteristics: Sparsely to densely vegetated sea cliffs, scree slopes and rocky (but not cobble-on-sand) coastlines exposed to salt spray and ocean wave action. The vascular vegetation is typically composed of grasses and low shrubs, which are restricted to small cracks in rock, or slight, sheltered depressions. Lichen cover can be high.

\*Classification Comments: Cobble-on-sand beach or coastal areas are included in ~North Pacific Maritime Coastal Beach & Dune Group (G498)$$ in ~Pacific Coastal Beach & Dune Macrogroup (M059)$$.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M044 | Californian Coastal Scrub | has overlapping floristics such as *Coreopsis gigantea, Artemisia californica*, and *Isocoma menziesii*, though other succulent and herbaceous taxa are more diagnostic of M058. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup comprises sparse vascular vegetation of creeping forbs, succulents, low grasses, dwarf-shrubs, and stunted trees clinging to cliff faces, bluffs and balds exposed to salt spray of the ocean. Lichen or moss cover can be high.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Forbs, grasses and shrubs establish on ledges and in cracks. On Amchitka Island, Shacklette et al. (1969) described several sea cliff communities, including *Eurhynchium-Puccinellia-Caloplaca, Potentilla-Draba-Saxifraga, Xanthoria-Ramalina*, and *Leymus-Ligusticum-Anemone*. On the Alaska Peninsula, dominance may shift to *Alnus viridis ssp. sinuata, Aruncus dioicus var. acuminatus, Campanula* spp., *Carex macrochaeta, Chamerion latifolium, Chamerion latifolium, Deschampsia* spp., *Fragaria chiloensis, Heuchera glabra, Lupinus nootkatensis, Phegopteris connectilis, Potentilla villosa, Prenanthes alata*, and *Rhodiola rosea*. On Haida Gwaii, *Festuca rubra* (native subspecies) is a common dominant of rocky headlands. Associated species include *Achillea millefolium, Conioselinum gmelinii, Fragaria chiloensis, Maianthemum dilatatum, Mimulus guttatus, Plantago maritima*, and *Potentilla villosa*. However, a wide range of other species may occur and may be dominant in some cases. *Picea sitchensis* tolerates salt spray and often occupies appropriate microsites on the rocky headlands. They are generally characterized by stunted growth, usually with branches from top to bottom of bole. Lichen cover can be high, but species are poorly described. On Haida Gwaii, the lichen cover in elevational bands above the intertidal have been characterized (Brodo and Sloan 2004).

Coastal bluffs further south, in the Georgia Strait and Puget Sound areas, also have *Festuca rubra* as a common dominant but associated species include *Bromus sitchensis, Grindelia integrifolia, Heuchera micrantha, Plectritis congesta, Sedum* spp., and *Zigadenus venenosus*, among others. Trees, if present, are stunted and/or windblown and may include *Arbutus menziesii, Quercus garryana*, or *Pseudotsuga menziesii*. *Juniperus maritima* may also occur. Shrubs are also infrequent and may include *Holodiscus discolor, Amelanchier alnifolia*, or *Mahonia aquifolium*. Mosses can be abundant, including species such as *Racomitrium canescens, Polytrichum piliferum*, or *Dicranum* spp. Introduced species are often found, e.g., *Aira* spp., *Cynosurus echinatus*, and *Cytisus scoparius*.

Coastal bluff-scrub on the California coastal islands has *Artemisia californica, Coreopsis gigantea, Dudleya caespitosa, Dudleya greenei, Eriogonum arborescens, Eriogonum giganteum, Eriogonum grande var. rubescens, Isocoma menziesii, Malacothrix saxatilis var. implicata*, and many other species, including many endemic species (Junak et al. 2007).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Steep slopes, salt spray, wind and wave erosion, desiccation, and slope failures create a harsh growing environment.

ENVIRONMENT

Environmental Description: This macrogroup includes rocky headlands and sea cliffs. Sea cliffs typically occur below 50 m elevation; however, on some extremely exposed cliffs, such as those on outer headlands, salt spray from winter storms may affect cliffs at 100-200 m elevation. Frequent exposure to salt spray distinguishes this macrogroup from inland and alpine rock outcrops and cliffs. Substrates include glacial deposits along the Pacific Ocean. Exposure to waves, eroding and desiccating winds, slope failures, and sheet erosion create rocky substrates that are often unstable. Soils are thin and limited to fine materials blown into cracks and fissures in the bedrock substrate.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs from the coast of the Aleutian Islands, central and southern Alaska coast, British Columbia and Washington south to Mexico.

Nations: CA, MX, US

States/Provinces: AK, BC, CA, MXBC, OR, WA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G554 | North Pacific Coastal Cliff & Bluff |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | III.B.1.a - Seral herbs | Viereck et al. 1992 |  |
| > | III.B.2.a - Mixed herbs | Viereck et al. 1992 |  |
| > | III.C.1.b - Dry bryophyte | Viereck et al. 1992 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel

Acknowledgments [optional]:

Version Date: 15 Oct 2014

REFERENCES

\*References [Required if used in text]:

Banner, A., W. H. MacKenzie, J. Pojar, A. MacKinnon, S. C. Saunders, and H. Klassen. 2004. A field guide to ecosystem classification and identification for Haida Gwaii. Province of British Columbia, Victoria. Land Management Handbook Number 68. [www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh68.htm]

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McPhee, M., P. Ward, J. Kirkby, L. Wolfe, N. Page, K. Dunster, N. K. Dawe, and I. Nykwist. 2000. Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands, 1993-1997. Volume 2: Conservation Manual. Technical Report Series No. 345, Canadian Wildlife Service, Pacific and Yukon Region, BC. [http://a100.gov.bc.ca/appsdata/acat/documents/r2124/SEI\_4206\_rpt2\_1111099716576\_7025110f245d45caa101abdef711671d.pdf]

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Ward, P., G. Radcliffe, J. Kirkby, J. Illingworth, and C. Cadrin. 1998. Sensitive Ecosystems Inventory: East Vancouver Island and Gulf Islands 1993-1997. Volume 1: Methodology, Ecological Descriptions and Results. Technical Report Series No. 320, Canadian Wildlife Service, Pacific and Yukon Region, Victoria, BC. [http://a100.gov.bc.ca/appsdata/acat/documents/r2124/SEI\_4206\_rpt1\_1111625239116\_8be42252200c4f0283b18cac66eed366.pdf]

2.C. Shrub & Herb Wetland

Shrub & Herb Wetland includes open bogs, fens, fresh and saltwater marshes, wet meadows and wet shrublands. The vegetation occurs from tropical to polar regions.

2.C.1. Tropical Bog & Fen

Tropical Bog & Fen is found where peat-accumulating conditions occur in the cold, wet mountain highlands and in various floodplains of the lowlands, where trees are excluded. They are dominated by sedges, heath, and moss peat.

2. Shrub & Herb Vegetation

2.C.1.Ef. Guianan Bog

D259. Guianan Bog

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.1.Ef. Tropical Bog & Fen (F002)

Elcode: D259

\*Scientific Name: Guianan Bog Division

\*Common (Translated Scientific) Name: Guianan Bog Division

\*Colloquial Name: Guianan Bog

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M706 | Tepuyan Bog |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.1.Ef. Guianan Bog

M706. Tepuyan Bog

Type Concept Sentence: Scrub or herbaceous meadows occurring on peat that forms under hyper-humid, cool conditions at the tops of the highest tepuis of the Guiana Shield at elevations between 1500-2600 m in Venezuela and Brazil. The physiognomies vary from dense, short shrublands to shrublands up to 3 m high with an herbaceous stratum dominated by rosette plants. The summits of the different tepuis have characteristic endemic species. Includes also *Stegolepis*-dominated meadows with vegetation up to 1.5 m high growing on slopes with a peat layer in the substrate; these meadows occur in the Gran Sabana at 900-1400 m elevation.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.1.Ef. Guianan Bog (D259)

Elcode: M706

\*Scientific Name: Tepuyan Bog Macrogroup

\*Common (Translated Scientific) Name: Tepuyan Bog Macrogroup

\*Colloquial Name: Tepuyan Bog

\*Type Concept: Scrub to herbaceous meadows that have in common a substrate composed of peat that forms under hyper-humid, cool conditions at the top of the highest tepuis of the Guiana Shield, at altitudes between 1500-2600 m asl in Venezuela and Brazil. The physiognomies vary from dense short shrublands to shrublands up to 3 m high with an herbaceous stratum dominated by rosette plants. It also can form open herbaceous meadows. The summits of the different tepuis have characteristics endemic species, which also makes the composition vary from one to another. Diagnostic species are *Bonnetia maguireorum, Archytaea multiflora, Tepuianthus auyantepuiensis, Blepharandra hypoleuca, Chimantaea* spp., *Bonnetia multinervia, Malophyton chimantense, Adenanthe bicarpellata*, and *Ledothamnus* spp. Under conditions of high water saturation, a marsh or bog develops with characteristic species such as *Drosera roraimae, Saxofridericia spongiosa, Lagenocarpus rigidus, Xyris involucrata*, and *Utricularia* spp. The macrogroup also includes a *Stegolepis*-dominated meadow up to 1.5 m high on slopes which present a peat layer in the substrate. It occurs on some locations in the Gran Sabana at 900-1400 m elevation. Characteristic species are *Drosera roraimae, Saxofridericia spongiosa, Lagenocarpus rigidus*, and *Xyris involucrata*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.1.Eg. Andean Montane Bog

D260. Andean Montane Bog

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.1.Eg. Tropical Bog & Fen (F002)

Elcode: D260

\*Scientific Name: Andean Montane Bog Division

\*Common (Translated Scientific) Name: Andean Montane Bog Division

\*Colloquial Name: Andean Montane Bog

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M708 | Tropical Andes Upper Montane Bog |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.1.Eg. Andean Montane Bog

M708. Tropical Andes Upper Montane Bog

Type Concept Sentence: High-Andean bogs distributed from Venezuela to Bolivia, occurring where minerotrophic systems are linked to water seeps and springs occurring in flat or depressed terrain. They develop on permanently waterlogged soils where peat forms and is deposited. The vegetation is dominated by plants which form mats or cushions, with a 100% cover of the soil at a height of 0.2 m. These communities have a similar composition along their latitudinal distribution in the Andes. Diagnostic species are *Colobanthus quitensis, Distichia filamentosa, Distichia muscoides, Eleocharis tucumanensis, Gentiana prostrata, Gentianella* spp., *Hypsela reniformis, Lucilia tunariensis, Lysipomia pumila, Myrosmodes paludosa, Oritrophium limnophilum, Ourisia muscosa, Plantago rigida, Plantago tubulosa*, and *Werneria pygmaea*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.1.Eg. Andean Montane Bog (D260)

Elcode: M708

\*Scientific Name: Tropical Andes Upper Montane Bog Macrogroup

\*Common (Translated Scientific) Name: Tropical Andes Upper Montane Bog Macrogroup

\*Colloquial Name: Tropical Andes Upper Montane Bog

\*Type Concept: This macrogroup represents all the high-Andean bogs distributed from Venezuela to Bolivia, which are minerotrophic systems directly or indirectly linked to water seeps and springs occurring in flat or depressed terrain. They develop on permanently waterlogged soils where peat forms and is deposited (Histosols). The vegetation is dominated by plants which form dense communities with 100% cover of the soil at no more than 0.2 m high, commonly known as mats or cushions. These communities have a similar composition along their latitudinal distribution in the Andes, and diagnostic species are *Distichia muscoides, Distichia filamentosa, Oxychloe andina, Oritrophium limnophilum, Deyeuxia jamesonii, Carex gayana, Castilleja pumila, Lucilia tunariensis, Ourisia muscosa, Scirpus acaulis, Plantago rigida, Plantago tubulosa, Werneria pygmaea, Gentianella primuloides, Gentianella primulifolia, Deyeuxia rigescens, Deyeuxia ovata, Hypsela reniformis, Aa paludosa, Eleocharis tucumanensis, Colobanthus quitensis, Gentiana prostrata, Lysipomia pumila, Myrosmodes paludosa*, and *Isoetes andicola*. Also included in this group are "paramos" occurring in depressions with waterlogged, hydromorphic soils where the herbaceous communities have also scattered shrubs, subshrubs and rosette plants such as *Puya* spp., *Arcytophyllum muticum, Diplostephium* spp., *Espeletia* spp., *Monticalia* spp., *Jamesonia glutinosa*, and *Sphagnum* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2.C.2. Temperate to Polar Bog & Fen

Temperate to Polar Bog & Fen includes temperate bogs and fens dominated by *Sphagnum* or brown mosses with ericaceous shrubs, graminoids, and low scrub tree growth forms, across the mid-latitudes of the Northern Hemisphere from 23° to 70°N, but is much less common in the southern mid-latitudes.

2. Shrub & Herb Vegetation

2.C.2.Eb. Southern Andean Montane Bog

D282. Southern Andean Montane Bog

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.2.Eb. Temperate to Polar Bog & Fen (F016)

Elcode: D282

\*Scientific Name: Southern Andean Montane Bog Division

\*Common (Translated Scientific) Name: Southern Andean Montane Bog Division

\*Colloquial Name: Southern Andean Montane Bog

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M758 | Southern Andean Montane Bog |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.2.Eb. Southern Andean Montane Bog

M758. Southern Andean Montane Bog

Type Concept Sentence: Cushion bogs of the Andes from central Chile and Argentina to Tierra del Fuego. In the northern part of their distribution they occur above 2500 m elevation and are minerotrophic. Because precipitation at this latitudes is limited, plant composition depends on water availability. A typical association is formed by *Gentiana sedifolia, Juncus* spp., *Oxychloe andina, Patosia clandestina, Pernettya pumila, Plantago barbata*, and *Werneria pygmaea*. Farther south, the bogs occur between 600-1500 m elevation and receive abundant precipitation. Here there are both minerotrophic and ombrotrophic bogs, which are permanently waterlogged and with active peat formation, and usually occurring in a mosaic with woody swamps. The cushion-forming species are *Oreobolus obtusangulus, Donatia fascicularis*, and *Sphagnum magellanicum*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.2.Eb. Southern Andean Montane Bog (D282)

Elcode: M758

\*Scientific Name: Southern Andean Montane Bog Macrogroup

\*Common (Translated Scientific) Name: Southern Andean Montane Bog Macrogroup

\*Colloquial Name: Southern Andean Montane Bog

\*Type Concept: Cushion bogs of the high Andes from central Chile and Argentina to Tierra del Fuego. In the northern part of their distribution they occur above 2500 m elevation and are minerotrophic, occurring on soils with very poor drainage. Since precipitation in this latitudes is lower, the composition of the plant communities depends on the chemical composition of the water that feeds them. A typical association is formed by *Patosia clandestina, Oxychloe andina, Plantago barbata, Calceolaria biflora, Gentiana sedifolia, Werneria pygmaea, Pernettya pumila, Juncus* spp., *Mimulus* sp. In the temperate part of their distribution, they occur between 600-1500 m elevation and receive abundant precipitation, hence there are both minerotrophic and ombrotrophic bogs, permanently waterlogged and with active peat formation, usually occurring in a mosaic with woody swamps. The cushion-forming dominant species are *Oreobolus obtusangulus, Donatia fascicularis*, and *Sphagnum magellanicum*, accompanied in less abundance by the palustrine herbs *Lepidothamnus fonckii, Drosera uniflora, Astelia pumila, Gentiana* sp., and the occasional presence of the shrub *Myrteola*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.2.Ec. Magellanian Bog & Fen

D283. Magellanian Bog & Fen

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.2.Ec. Temperate to Polar Bog & Fen (F016)

Elcode: D283

\*Scientific Name: Magellanian Bog & Fen Division

\*Common (Translated Scientific) Name: Magellanian Bog & Fen Division

\*Colloquial Name: Magellanian Bog & Fen

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M759 | Magellanian Anti-Boreal Bog & Fen |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.2.Ec. Magellanian Bog & Fen

M759. Magellanian Anti-Boreal Bog & Fen

Type Concept Sentence: Blanket bogs of the Magellanic region dominated by short or medium-tall graminoids growing on wet or saturated soils. Diagnostic species are *Carex canescens, Carex magellanica, Hierochloe magellanica, Marsippospermum grandiflorum, Marsippospermum reichei*, and *Scirpus inundatus*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.2.Ec. Magellanian Bog & Fen (D283)

Elcode: M759

\*Scientific Name: Magellanian Anti-Boreal Bog & Fen Macrogroup

\*Common (Translated Scientific) Name: Magellanian Anti-Boreal Bog & Fen Macrogroup

\*Colloquial Name: Magellanian Anti-Boreal Bog & Fen

\*Type Concept: Blanket bogs of the Magellanic region dominated by short or medium-tall graminoids on soils wet or soaked throughout the year. Diagnostic species are *Marsippospermum grandiflorum, Marsippospermum reichei, Scirpus inundatus, Hierochloe magellanica, Carex magellanica*, and *Carex canescens (= Carex curta)*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.2.Na. North American Bog & Fen

D029. North American Bog & Fen

Type Concept Sentence: This division includes open and treed bogs and fens throughout much of North America from the boreal zone in Canada south to northern California, montane areas in the western United States, the northern Great Plains, and much of the midwestern and northeastern United States and southeastern Canada.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.2.Na. Temperate to Polar Bog & Fen (F016)

Elcode: D029

\*Scientific Name: *Chamaedaphne calyculata / Carex oligosperma - Sphagnum* spp. Bog & Fen Division

\*Common (Translated Scientific) Name: Leatherleaf / Few-seed Sedge - Peatmoss species Bog & Fen Division

\*Colloquial Name: North American Bog & Fen

\*Type Concept: This division includes open and treed bogs and fens throughout much of North America from the boreal zone in Canada south to northern California, montane areas in the western United States, the northern Great Plains, and much of the northeastern United States. Bogs and fens are dominated by shrubs or herbaceous vegetation. In the boreal, montane, and northern temperate areas, vegetation is often low with stunted or short trees, dwarf-shrubs and graminoids dominant. Dominant species vary greatly across the geographic range and differences in water chemistry/minerotrophy. Acidic stands typically usually contain dwarf-shrubs such as *Andromeda polifolia, Betula nana, Chamaedaphne calyculata, Empetrum nigrum, Kalmia polifolia, Ledum groenlandicum*, and *Vaccinium* spp. A diverse group of sedges may be present. Common sedges include *Carex aquatilis, Carex oligosperma, Carex chordorrhiza, Carex limosa, Carex livida, Carex lasiocarpa, Carex magellanica ssp. irrigua, Carex pauciflora*, and *Carex pluriflora*. Other herbs include *Eriophorum vaginatum, Eriophorum virginicum, Drosera rotundifolia, Menyanthes trifoliata, Sarracenia purpurea*, and *Scheuchzeria palustris*. The most common stunted trees include *Picea mariana, Larix laricina*, and *Pinus contorta var. contorta*. Species more likely to be found in circumneutral to alkaline wetlands include short or tall shrubs such as *Alnus serrulata, Betula* spp., *Cornus amomum, Cornus sericea, Dasiphora fruticosa ssp. floribunda, Myrica gale, Salix* spp., and herbaceous species such as *Carex interior, Carex lurida, Carex leptalea, Carex sterilis, Comarum palustre, Dulichium arundinaceum, Lobelia kalmii, Spartina pectinata*, and *Symplocarpus foetidus*. *Sphagnum* spp., liverworts, and brown mosses are very common or abundant in many sites. Common short trees include *Larix laricina*, and southward, *Thuja occidentalis*. Soils are organic peat, muck, or marl and saturated throughout most or all of the growing season. Water chemistry and nutrient levels are important in maintaining the character of these wetlands. The pH can vary from acidic to basic, and mineral input varies from very poor in ombrotrophic bogs to rich in some fens. Water source can be limited to only precipitation (true bogs) to mineral-rich groundwater flow, precipitation, and overland runoff. In boreal and sub-boreal settings, bogs and fens can be very extensive, occupying many hectares in relatively shallow basins. Throughout the range of this division, stands can be of more limited size in smaller depressions, along the edges of streams or lakes, or where groundwater seeps or springs reach the surface.

\*Diagnostic Characteristics: Depth of peat accumulation (>40 cm) is a typical distinguishing abiotic characteristic of this division. Richer sites may contain mucky or marl soils. Vegetation is dominated by shrubs, and often with a strong bryophyte component. Acidic stands typically usually contain dwarf-shrubs such as *Andromeda polifolia, Betula nana, Chamaedaphne calyculata, Empetrum nigrum, Kalmia polifolia, Ledum groenlandicum*, and *Vaccinium* spp. A diverse group of sedges may be present. Common sedges include *Carex aquatilis, Carex oligosperma, Carex chordorrhiza, Carex limosa, Carex livida, Carex lasiocarpa, Carex magellanica ssp. irrigua, Carex pauciflora*, and *Carex pluriflora*. Other herbs include *Eriophorum vaginatum, Eriophorum virginicum, Drosera rotundifolia, Menyanthes trifoliata, Sarracenia purpurea*, and *Scheuchzeria palustris*. The most common stunted trees include *Picea mariana, Larix laricina* and *Pinus contorta var. contorta*. Species more likely to be found in circumneutral to alkaline wetlands include short or tall shrubs such as *Alnus serrulata, Betula* spp., *Cornus amomum, Cornus sericea, Dasiphora fruticosa ssp. floribunda, Myrica gale*, and herbaceous species such as *Carex interior, Carex lurida, Carex leptalea, Carex sterilis, Comarum palustre, Dulichium arundinaceum, Sphagnum* spp., liverworts, and brown mosses are very common or abundant in many sites. Common short trees include *Larix laricina*, and southward, *Thuja occidentalis*. Diagnostic bryophyte species need to be added.

\*Classification Comments: Depth of peat accumulation (>40 cm) is a typical distinguishing abiotic characteristic of this division. This does not apply to all sites in the Midwest and East, particularly sites with no peat (e.g., marly soils) but may help define sites with peat accumulation. Ozark and Interior Low Plateau fens are not treated here; rather they are placed in ~Eastern North American Cool Temperate Seep Macrogroup (M061)$$, ~Central Interior Seepage Fen Group (G182)$$. Better characterization of the sphagnum species is needed.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D193 | Vancouverian Flooded & Swamp Forest |  |
| D016 | North American Boreal Flooded & Swamp Forest | is dominated by trees rather than shrub/herbaceous vegetation. |
| D324 | Atlantic & Gulf Coastal Plain Pocosin | The very different climate and floristic composition of pocosins warrants their own division. |
| D031 | Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland | occurs on mineral soils or shallow organic soils. |
| D323 | Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland | Ozark fens are treated in this division, in ~Eastern North American Cool Temperate Seep Macrogroup (M061)$$, ~Central Interior Seepage Fen Group (G182)$$. |
| D322 | Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Bogs and fens are dominated by shrubs or dwarf-shrubs, herb, and moss vegetation. Acidic stands are typically heath or ericaceous. Short or stunted trees are often present but trees >5-10 m tall have <10% canopy.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Dominant species vary greatly across the geographic range and differences in water chemistry/minerotrophy. Acidic stands typically usually contain dwarf-shrubs such as *Andromeda polifolia, Betula nana, Chamaedaphne calyculata, Empetrum nigrum, Kalmia polifolia, Ledum groenlandicum*, and *Vaccinium* spp. A diverse group of sedges may be present. Common sedges include *Carex aquatilis, Carex oligosperma, Carex chordorrhiza, Carex limosa, Carex livida, Carex lasiocarpa, Carex magellanica ssp. irrigua (= Carex paupercula), Carex pauciflora*, and *Carex pluriflora*. Other herbs include *Eriophorum vaginatum, Eriophorum virginicum, Drosera rotundifolia, Menyanthes trifoliata, Sarracenia purpurea*, and *Scheuchzeria palustris*. The most common stunted trees include *Picea mariana, Larix laricina* and *Pinus contorta var. contorta*. Species more likely to be found in circumneutral to alkaline wetlands include short or tall shrubs such as *Alnus serrulata, Betula* spp., *Cornus amomum, Cornus sericea, Dasiphora fruticosa ssp. floribunda, Myrica gale, Salix* spp., and herbaceous species such as *Carex interior, Carex lurida, Carex leptalea, Carex sterilis, Comarum palustre, Dulichium arundinaceum, Lobelia kalmii, Spartina pectinata*, and *Symplocarpus foetidus*. *Sphagnum* spp., liverworts, and brown mosses are very common or abundant in many sites. Common short trees include *Larix laricina*, and southward, *Thuja occidentalis*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: *Soils/substrate:* Soils are organic peat, muck, or marl and saturated throughout most or all of the growing season. Depth of peat accumulation (>40 cm) is typical, but richer sites may contain mucky or marl soils. Water chemistry and nutrient levels are important in maintaining the character of these wetlands. The pH can vary from acidic to basic, and mineral input varies from very poor in ombrotrophic bogs to rich in some fens. Water source can be limited to only precipitation (true bogs) to mineral-rich groundwater flow, precipitation, and overland runoff. In boreal and sub-boreal settings, bogs and fens can be very extensive, occupying many hectares in relatively shallow basins. Throughout the range of this division, stands can be of more limited size in smaller depressions, along the edges of streams or lakes, or where groundwater seeps or springs reach the surface.

DISTRIBUTION

\*Geographic Range: This division is found from boreal Canada south to northern California and the mountainous western U.S., in the northern Great Plains, and across the midwestern and northeastern United States and southeastern Canada.

Nations: CA, US

States/Provinces: AB, AK, AL, AR, AZ, BC, CA, CO, CT, DE, IA, ID, IL, IN, KY, MA, MB, MD, ME, MI, MN, MO, MT, NB, ND, NH, NJ, NS, NT, NU, NV, NY, OH, ON, OR, PA, PE?, QC, RI, SD, SK, TN, UT, VA, VT, WA, WI, WV, WY, YT

USFS Ecoregions (2007) [optional]: 211:C, 212:C, 221:C, 222:C, 232:C, 242:C, 251:C, 331:C, 341:C, 342:C, M211:C, M221:C, M242:C, M261:C, M331:C, M332:C, M333:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M876 | North American Boreal & Subboreal Bog & Acidic Fen |
| M877 | North American Boreal & Subboreal Alkaline Fen |
| M063 | North Pacific Bog & Fen |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | *Oxycocco-Sphagnetea* | Rodwell et al. 2002 | acidic peatlands of Europe. |
| < | *Scheuchzerio-Caricetea fuscae* | Rodwell et al. 2002 | alkaline peatlands of Europe. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: W.J. Mitsch and J.G. Gosselink (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Faber-Langendoen and J. Drake

Acknowledgments [optional]:

Version Date: 06 Jan 2016

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Mitsch, W. J., and J. G. Gosselink. 2000. Wetlands. Third edition. John Wiley & Sons, Inc., New York. 920 pp.

Rodwell, J. S., J. H. J. Schamineé, L. Mucian, S. Pignatti, J. Dring, and D. Moss. 2002. The diversity of European vegetation. An overview of phytosociological alliances and their relationships to EUNIS habitats. Report EC-LNV nr. 2002/054. National Reference Centre for Agriculture, Nature and Fisheries, Wageningen,The Netherlands.

2. Shrub & Herb Vegetation

2.C.2.Na. North American Bog & Fen

M876. North American Boreal & Subboreal Bog & Acidic Fen

Type Concept Sentence: This boreal acidic bog and fen macrogroup extends across the boreal regions of North America, extending south into subboreal regions of the Pacific Maritimes and Rocky Mountains, the Great Lakes region and northeastern U.S. It is dominated by a continuous layer of *Sphagnum* mosses (sometimes submerged in bog pools), typically to depths exceeding 40 cm, as well as ericaceous dwarf-shrubs and thin-leaved graminoids. Scrub trees may be common, but trees are otherwise sparse.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.2.Na. North American Bog & Fen (D029)

Elcode: M876

\*Scientific Name: *Chamaedaphne calyculata - Vaccinium oxycoccos - Carex oligosperma* Bog & Acidic Fen Macrogroup

\*Common (Translated Scientific) Name: Leatherleaf - Small Cranberry - Few-seed Sedge Bog & Acidic Fen Macrogroup

\*Colloquial Name: North American Boreal & Subboreal Bog & Acidic Fen

\*Type Concept: This macrogroup extends across the boreal regions of North America, extending south into subboreal regions of the Pacific Maritime and Rocky Mountain divisions, Great Lakes region and northeastern U.S. It occurs where sufficiently cold climatic conditions allow the rate of peat accumulation to exceed its decomposition, resulting in ombrotrophic and acidic peatlands in which the bog surface is raised above the water table. Stands are dominated by a continuous layer of *Sphagnum* mosses (sometimes submerged in bog pools) and ericaceous dwarf-shrubs and thin-leaved graminoids. Scrub trees <2 m may be common, but trees >5 m are <10% cover. Dominant shrubs include *Andromeda polifolia, Betula nana, Chamaedaphne calyculata, Empetrum nigrum, Gaultheria hispidula, Kalmia polifolia, Ledum palustre ssp. decumbens, Ledum groenlandicum, Rubus chamaemorus, Vaccinium macrocarpon* (east), *Vaccinium oxycoccos, Vaccinium vitis-idaea*, and *Vaccinium uliginosum*. The herbaceous layer is typically graminoid-dominated. Species include *Carex aquatilis, Carex lasiocarpa, Carex livida, Carex membranacea, Carex microglochin, Carex oligosperma* (more eastern), *Carex pauciflora, Carex pluriflora, Carex rariflora* (more eastern), *Carex rotundata* (more eastern), *Carex stylosa, Eriophorum angustifolium, Eriophorum brachyantherum*, and *Eriophorum virginicum*. Graminoids common to both poorer and richer fens include *Carex chordorrhiza, Carex lasiocarpa*, and *Carex limosa* Insectivorous plants are common features of bogs and may include *Drosera intermedia, Drosera rotundifolia, Sarracenia purpurea*, and *Utricularia intermedia*. Trees include *Picea mariana, Picea glauca*, and *Larix laricina*.

Acidic peatlands range from strictly ombrotrophic bog (isolated from groundwater, precipitation-fed) to weakly minerotrophic poor fen. The surface morphology of a bog may be more-or-less level, domed, or eccentric, but typically is above the water table. As peat accumulates, ridges may form, which can be relatively dry compared to the flat areas. Secondary bog pools (schlenke) may be present in the raised portions of the peatlands. Peat deposits are composed primarily of partially decomposed *Sphagnum* mosses, and depth of peat exceeds 40 cm, separating this from similar wetlands that are non-peatlands. The water table is at or just above the surface, although the surface of some bogs is raised above the surrounding terrain.

In the eastern U.S., acidic peatlands extend southward through the Great Lakes and Northeast. Here *Sphagnum* and shrub peatlands occur in basins south through the Laurentian-Acadian region down to near the glacial boundary in the northeastern and north-central U.S. Unlike the true raised bogs of boreal regions, the vegetation is not raised above the groundwater level. The nutrient-poor substrate and the reduced throughflow of water create oligotrophic conditions fostering the development of *Sphagnum* peat and the growth of peatland vegetation. Although these peatlands are often called bogs, in most cases they are technically "poor fens," as the vegetation remains in contact with the weakly minerotrophic (nutrient-poor) groundwater.

In the Atlantic region, from Labrador to Downeast Maine, acidic peatlands take a somewhat different form. In basins, they develop raised plateaus with undulating sedge and dwarf-shrub vegetation. *Trichophorum cespitosum* may form sedge lawns on the raised plateau. The system may also occur as "blanket bogs" over a sloping rocky substrate in extreme maritime settings; here, dwarf-shrubs and *Sphagnum* are the dominant cover. Species characteristic of this maritime setting include *Empetrum nigrum* and *Rubus chamaemorus*. Typical bog heaths such as *Gaylussacia dumosa, Gaylussacia baccata, Kalmia angustifolia, Kalmia polifolia*, and *Ledum groenlandicum* are also present. Morphological characteristics and certain coastal species distinguish these from more inland acidic peatlands.

\*Diagnostic Characteristics: This macrogroup contains a continuous (>80% cover) layer of *Sphagnum* peatmoss (sometimes submerged in bog pools), to depths exceeding 40 cm, with ericaceous dwarf-shrubs and thin-leaved graminoids >25% cover. Scrub trees <2 m may be common, but trees >5 m are <10% cover. Diagnostic species include low ericaceous shrubs, including *Andromeda polifolia, Betula nana, Chamaedaphne calyculata, Empetrum nigrum, Gaultheria hispidula, Kalmia angustifolia* (east), *Kalmia polifolia, Ledum palustre ssp. decumbens, Ledum groenlandicum, Rubus chamaemorus, Vaccinium macrocarpon* (east), *Vaccinium oxycoccos, Vaccinium vitis-idaea*, and *Vaccinium uliginosum*. Ericaceous shrubs are typically >75% of total shrub cover. Trees, if present, include *Picea mariana* and *Larix laricina*. Graminoids such as *Carex oligosperma* (more east), *Carex magellanica ssp. irrigua, Carex pauciflora, Eriophorum vaginatum*, and *Eriophorum virginicum* are common in the herb layer, and together these graminoids have greater cover than medium to rich fen graminoid indicators (*Carex lasiocarpa, Carex livida, Carex interior, Carex limosa, Eriophorum viridicarinatum, Muhlenbergia glomerata, Trichophorum alpinum*). Species diversity is low.

\*Classification Comments: North American arctic bog was moved under this macrogroup, based on the view from Alaskan ecologists that arctic bogs (which are uncommon) are not that different from boreal bogs. Strong diagnostic species that separate eastern from western acidic peatlands are not currently known. Clarification of the limits of this type with respect to Vancouverian (North Pacific) and Rocky Mountain acidic fens is also needed. Forested acidic bogs and fens (poor swamps) are not included here [see ~North American Boreal Conifer Poor Swamp Macrogroup (M299)$$, but that concept is under review (as of May 2014)]. There is a shift in composition and physiognomy from north to south, including from evergreen conifers and shrubs to deciduous shrub and hardwood species.

Inclusion of "northern temperate" (subboreal) acidic peatlands and Atlantic maritime peatlands needs review; they may need to be separated out into distinct macrogroups (K. Baldwin pers. comm. 2014).

Both this macrogroup (M876) and ~North American Boreal & Subboreal Alkaline Fen Macrogroup (M877)$$ are organic wetlands or peatlands in the Canadian wetland classification system. The Canadian system separates bogs from fens based on the influence of nutrient-rich groundwater in fens, which is missing in bogs. However, here we include poor fens with bogs because both bogs and poor fens tend to be acidic, are similar in vascular species composition, and are dominated by *Sphagnum* spp. in the bryophyte layer.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M299 | North American Boreal Conifer Poor Swamp |  |
| M063 | North Pacific Bog & Fen |  |
| M877 | North American Boreal & Subboreal Alkaline Fen |  |
| M061 | Eastern North American Cool Temperate Seep |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup contains a continuous (>80% cover) layer of *Sphagnum* moss (sometimes submerged in bog pools). The vegetation is otherwise dominated by low ericaceous shrubs with patches of conifers, graminoids and bryophyte lawns. Stunted trees may form a partial to moderate cover over parts of the peatland, but the tree layer is <10% cover (Damman and French 1987). The overall topography of acidic peatlands is flat to gently undulating with microtopography characterized by hummocks and hollows (Heinselman 1963, Vitt and Slack 1975, Wheeler et al. 1983, Glaser et al. 1990). The pronounced microtopography in these systems leads to extreme and fine-scale gradients in soil moisture and pH (Bridgham et al. 1996).

The landscape morphology of acidic peatlands is often very striking. A variety of approaches has been taken to describe these forms: in Maine, see Davis and Anderson (2001); in Canada, see National Wetlands Working Group (1988); and in Minnesota see Glaser (1992a). In Canada, bog and fen peatlands each have their own set of forms. In Minnesota, Glaser treats bogs and fens together as part of larger patterned peatland complexes (mire complexes). Particularly distinctive are the ribbed bogs or fens in which a pattern of narrow (2- to 3-m wide), low (less than 1 m deep) ridges are oriented at right angles to the direction of the drainage (National Wetlands Working Group 1988). Wet pools or depressions occur between the ridges. These patterned peatlands may include string bog, Atlantic ribbed fen, or northern ribbed fen (National Wetlands Working Group 1988). They develop almost entirely north of 46°N latitude in east-central Canada and the adjacent U.S. They are minerotrophic peatlands in which the vegetation has developed into a pattern of strings (raised, usually linear features, and often more acidic) and flarks (wet depressions separating the strings, often less acidic). These patterned peatlands usually develop in open basins and flat plains, and the patterned portion may occupy only a fraction of the entire peatland. The edge of the basin may be shallow to deep peat over a sloping substrate, where seepage waters provide nutrients.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: In the western part of the range, the stunted and sparse tree layer includes *Picea mariana* and *Larix laricina* (*Picea glauca* is occasionally present). Dominant shrubs include *Andromeda polifolia, Betula nana, Chamaedaphne calyculata, Empetrum nigrum, Kalmia polifolia, Ledum groenlandicum, Ledum palustre ssp. decumbens, Rubus chamaemorus, Vaccinium oxycoccos, Vaccinium uliginosum*, and *Vaccinium vitis-idaea*. The herbaceous layer is typically graminoid-dominated. Species include *Carex chordorrhiza, Carex lasiocarpa, Carex limosa, Carex livida, Carex membranacea, Carex microglochin, Carex pauciflora, Carex pluriflora, Carex rariflora* (more eastern), *Carex rotundata* (more eastern), *Carex stylosa, Eriophorum brachyantherum*, and *Eriophorum angustifolium*. Dominant mosses include, among others, *Sphagnum fuscum* and *Sphagnum capillifolium (= Sphagnum nemoreum)* (Horton et al. 1979). In the Rocky Mountains, acidic fens associated with peatlands more closely resemble the vegetation of bogs, with sphagnum mosses and ericaceous shrubs. Dominant species include *Carex aquatilis, Carex livida, Carex lasiocarpa, Dulichium arundinaceum, Ledum glandulosum*, and *Trichophorum cespitosum* (Cooper 1986b, Windell et al. 1986, Steen and Coupé 1997).

In the east, tree species include *Picea mariana, Picea glauca*, and *Larix laricina* (less commonly *Picea glauca, Abies balsamea* and *Thuja occidentalis*). Dwarf-shrubs include *Andromeda polifolia, Chamaedaphne calyculata, Kalmia polifolia, Ledum groenlandicum, Vaccinium macrocarpon, Vaccinium oxycoccos*, and occasionally *Gaultheria hispidula* or *Betula pumila*. Rarely, tall ericaceous shrubs such as *Vaccinium corymbosum* (northeast temperate peatlands) are dominant. Common sedges include *Carex magellanica ssp. irrigua (= Carex paupercula)* and *Carex oligosperma*. Graminoids common to both poorer and richer fens include *Carex chordorrhiza, Carex lasiocarpa*, and *Carex limosa*. Other herbs include *Eriophorum vaginatum, Eriophorum virginicum, Menyanthes trifoliata*, and *Scheuchzeria palustris*. Dominant mosses include *Sphagnum fuscum* and *Sphagnum magellanicum*, and less commonly *Sphagnum angustifolium*. *Pleurozium schreberi* can be common on raised mats (Harris et al. 1996, Minnesota DNR 2003). Insectivorous plants are common features of acidic peatlands and may include *Drosera rotundifolia, Drosera intermedia, Sarracenia purpurea*, and *Utricularia intermedia*. *Rhynchospora alba, Xyris montana*, and *Xyris torta* can be especially common on floating mats (Kost et al. 2007).

In the Atlantic region, from Labrador to Downeast Maine, acidic peatlands develop raised plateaus with undulating sedge and dwarf-shrub vegetation. *Trichophorum cespitosum* may form sedge lawns on the raised plateau. The system may also occur as "blanket bogs" over a sloping rocky substrate in extreme maritime settings; here, dwarf-shrubs and *Sphagnum* are the dominant cover. Species characteristic of this maritime setting include *Empetrum nigrum* and *Rubus chamaemorus*. Typical bog heaths such as *Gaylussacia dumosa, Gaylussacia baccata, Kalmia angustifolia, Kalmia polifolia*, and *Ledum groenlandicum* are also present. *Betula michauxii* may also be common. Morphological characteristics and certain coastal species distinguish these from more inland acidic peatlands.

Further south in the sub-boreal region, two major physiognomic types occur: first, the ericaceous dwarf-shrub bog, often dominated by *Chamaedaphne calyculata*, sometimes with distinctive southern and coastal elements such as *Gaylussacia dumosa, Ilex glabra*, and *Morella pensylvanica*, and with other constant and dominant species, including *Kalmia angustifolia* (east), *Kalmia polifolia* (north),and *Ledum groenlandicum* (north); and second, a tall-shrub peat thicket dominated by deciduous ericaceous shrubs, especially *Vaccinium corymbosum* (*Ilex verticillata* and *Cephalanthus occidentalis* can dominate on shallower peat and the moat along the bog border), and wet peatland margins. Graminoids such as *Carex oligosperma, Carex magellanica ssp. irrigua (= Carex paupercula), Eriophorum angustifolium* (north and midwest), *Eriophorum virginicum* (throughout and southward), and *Eriophorum vaginatum* are common in the herb layer. Some peatlands may have a sparse tree layer (<10% cover) or stunted (<2 m) stems of *Larix laricina, Picea mariana*, or *Acer rubrum*. Somewhat richer sites may include *Myrica gale* and *Dulichium arundinaceum* (Damman and French 1987). Distinctive southern shrubs present include *Alnus serrulata, Clethra alnifolia, Gaylussacia frondosa, Lyonia ligustrina, Rhododendron periclymenoides (= Rhododendron nudiflorum), Rhododendron viscosum*, and *Toxicodendron vernix (= Rhus vernix)*. Diagnostic southern herbs include *Woodwardia virginica*. More northern (but not boreal) shrubs include *Alnus incana ssp. rugosa (= Alnus rugosa), Alnus viridis* (along coast), *Ilex mucronata (= Nemopanthus mucronatus)*, and *Viburnum nudum var. cassinoides* (Damman and French 1987).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: In boreal wetlands the general successional trend is sometimes portrayed as proceeding from marsh to fen to treed bog. Although often true (Klinger and Short 1996), succession is not necessarily directional, and environmental conditions, such as nutrient content and abundance of groundwater, may prevent fens from developing into bogs (Zoltai et al. 1988). Succession can begin in shallow ponds or low-lying wetlands formed by processes such as glacial recession and floodplain dynamics (oxbows) or thermokarst. An organic root mat typically develops and is either anchored to the mineral soil or floating on water such as a pond's edge. Over time, peat-forming mosses and sedges may fill in the basin. As the peat layer develops, low and/or dwarf-shrubs become established. Dwarf-trees may establish on the well-developed peat and also around the margin of the peatland.

Many researchers have reported fire as a significant part of the disturbance regime of bogs (Dean and Coburn 1927, Gates 1942, Curtis 1959). The role of fire disturbance in acidic peatlands needs review.

Beaver, through their dam-building activities, can cause substantial hydrologic change to peatland systems, either causing flooding or the lowering of the water table, depending on the location of the peatland in relation to the dam (Gates 1942, Curtis 1959, Heinselman 1963, Jeglum 1975, Futyma and Miller 1986, cited in Kost et al. 2007).

Many peatlands on the Kenai Lowland formed in kettles after remnant glacial ice melted. In this region there is a trend toward peatlands drying and ponds shrinking and filling in. Permafrost degradation leading to collapse scars and thaw ponds is common in boreal Alaska, and studies from the Tanana Flats show areas of widespread degradation. Thaw ponds form when ice-rich permafrost degrades and collapses forming a basin. Aquatic plants rapidly colonize the pond. Over time, marsh plants and sphagnum mosses invade creating peatland conditions. This trend is leading to widespread ecosystem conversion in the Tanana Flats (Jorgenson et al. 2001b). If a collapse scar is isolated, succession follows a bog development model, whereas in an open hydrologic setting, succession follows a fen development model. Pond systems may become connected as adjacent permafrost thaws.

ENVIRONMENT

Environmental Description: Sites are generally hummocky with gently to more steeply (up to 8°) sloping terrain. Peatlands form where the rate of peat accumulation exceeds its decomposition, resulting in ombrotrophic and acidic peatlands in which the bog surface may be raised above the water table. Sites are found in depressions, on acidic seepage slopes, with either ombrotrophic or weakly minerotrophic groundwater. They occur in a variety of landforms, including peat bog-lake systems (lake-fill bogs, moat bogs, and pond border bogs), perched water-peatland systems in valleys and depressions, peat bog-stream systems, and ombrogenous peatland systems, including raised bogs (Damman and French 1987). Permafrost is only present in boreal Alaska and northern Canada, where it may form permafrost plateaus (Camill 1999). Where permafrost is present, thermokarst pools may result in roughly circular open pools with floating carpets of *Sphagnum riparium* and *Sphagnum jensenii*, with low *Sphagnum angustifolium* mounds in shallow spots (Horton et al. 1979, L. Allen pers. comm. 2014).

Acidic peatlands found in kettle depressions are associated with active or extinct glacial lakes. Within kettle depressions, the "kettle bogs" can occupy the entire basin or frequently occur as a mat (floating or grounded) on the margin of the remaining glacial lake. When bogs and poor fens occur along the edge of large bodies of water, they are found in sheltered bays or coves that are protected from wave and ice action, which can prevent the development of peat or erode existing peat mats. Those occurring on former glacial lakebeds and drainageways tend to be more extensive than kettle bogs, which are limited in area by the size of the glacial ice-block that formed the basin (Kost et al. 2007).

In the northeastern United States, true bogs may reach their core southern limit in Maine and extreme northern New Hampshire and Vermont (Damman and French 1987, figure 3), though isolated occurrences are possible southward, including in New York. Southward poor fens are found in areas where glacial stagnation left coarse deposits and glacial depressions (many are "kettleholes"). The basins are generally closed, i.e., without inlets or outlets of surface water, and typically small in area. The nutrient-poor substrate and the reduced throughflow of water create oligotrophic conditions fostering the development of *Sphagnum* peat and the growth of peatland vegetation. These acidic peatlands occur in a variety of landforms, including peat bog-lake systems (lake-fill bogs, moat bogs, and pond border bogs), perched water-peatland systems in valleys and depressions, and more rarely peat bog-stream systems.

In the Rocky Mountains, fens are wetlands that develop where a relatively constant supply of groundwater maintains saturated conditions and the water chemistry reflects the mineralogy of the local soils and geological materials (Bedford and Godwin 2003). Organic soil of partially decomposed peat has a minimum depth of 40 cm (although some authors use 30-cm depth criteria). Acidic fens arise either because the groundwater accounts for only a small fraction of the annual water budget or because groundwater inputs move through materials with low solubility and are non-calcareous (e.g., basalt gneiss, granite) or have low buffering capacity (e.g., sand, quartz) (Bedford and Godwin 2003).

DISTRIBUTION

\*Geographic Range: This macrogroup extends across the western boreal regions of North America, extending south into subboreal regions of the Pacific Maritime and Rocky Mountain divisions. In the east, it extends across the boreal regions of central and eastern Canada and southward into adjacent subboreal and cold temperate regions of Canada and northeast and north-central United States. It occurs infrequently throughout the mountains of the Interior West, the Sky Islands of Arizona and high mountains and plateaus of Nevada and Utah, and the Rocky Mountains of Utah, Colorado, Wyoming, Montana, Idaho, and north into interior Canada, where it is known from interior (non-coastal) British Columbia, Alberta and Alaska. It is associated with the glacial terminus or stagnation zones, and interior from the Atlantic Coastal Plain. Maritime examples occur near the coast from eastern Maine (Mount Desert Island) eastward into the Canadian Maritimes and the coast of Labrador. Subboreal acidic peatlands are found in lower New England and southern New York, south to Pennsylvania, New Jersey and high montane regions of West Virginia, and westward to extreme southern Ontario, northern Ohio, northern Indiana and Illinois, Michigan and Wisconsin.

Nations: CA, US

States/Provinces: AB, AK, BC, CT, ID?, IL, IN, MA, MB, ME, MI, MN, MT, NB, NH, NJ, NS, NT, NY, OH, ON, OR?, PA, PE?, QC, RI, SK, VT, WA?, WI, WV, YT

USFS Ecoregions (2007) [optional]: 211A:CP, 211E:CC, 211F:CC, 211I:CC, 211J:CC, 212Ha:CCP, 212Hb:CCP, 212Hc:CCP, 212Hd:CCP, 212He:CCC, 212Hf:CCC, 212Hg:CCC, 212Hh:CCP, 212Hi:CCC, 212Hj:CCP, 212Hk:CCC, 212Hl:CCC, 212Hm:CCP, 212J:CC, 212K:CC, 212L:CC, 212M:CC, 212N:CC, 212Q:CP, 212Ra:CCP, 212Rb:CCC, 212Rc:CCC, 212Rd:CCC, 212Re:CCC, 212S:CC, 212Tb:CCC, 212Te:CCP, 212X:CC, 212Y:CC, 212Z:CC, 221A:CC, 221B:CC, 221D:CC, 221E:CC, 221Fa:CCC, 222H:CC, 222I:CC, 222Ja:CCC, 222Jb:CCC, 222Jc:CCC, 222Je:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222R:CC, 222Ua:CCP, 222Ud:CCC, 222Ue:CCC, M211A:CP, M211B:CP, M211C:CC, M242D:??

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G748 | Eastern North American Boreal Bog & Acidic Fen |
| G745 | Eastern North American Subboreal Bog & Acidic Fen |
| G515 | Rocky Mountain Acidic Fen |
| G360 | Western North American Boreal Bog & Acidic Fen |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-11-18 | M064 Carex limosa - Eleocharis quinqueflora - Carex buxbaumii Rocky Mountain Fen Macrogroup | M064 split into M876 & M877 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Bog Wetland Class | National Wetlands Working Group 1988 |  |
| = | Bog and Poor Fen | Kost et al. 2007 |  |
| = | Bog and Poor Fen | Cohen et al. 2015 |  |
| > | Peatlands | Mitsch and Gosselink 2000 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: National Wetlands Working Group (1988)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Faber-Langendoen, G. Kittel, M. Reid, M. Hall, K. Boggs, T. Boucher, S.C. Gawler

Acknowledgments [optional]:

Version Date: 29 Mar 2017

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2. Shrub & Herb Vegetation

2.C.2.Na. North American Bog & Fen

M877. North American Boreal & Subboreal Alkaline Fen

Type Concept Sentence: This alkaline fen macrogroup occurs on peatlands across the boreal regions of North America, extending south into subboreal regions of the Rocky Mountains, Great Lakes, and northeastern and north-central U.S. *Sphagnum* peatmoss and ericaceous shrubs are patchy to absent and brown mosses, broad-leaved non-ericaceous shrubs, and thin-leaved graminoids are common.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.2.Na. North American Bog & Fen (D029)

Elcode: M877

\*Scientific Name: *Dasiphora fruticosa ssp. floribunda - Carex lasiocarpa / Campylium stellatum* Alkaline Fen Macrogroup

\*Common (Translated Scientific) Name: Shrubby cinquefoil - Woolly-fruit Sedge / Star Campylium Moss Alkaline Fen Macrogroup

\*Colloquial Name: North American Boreal & Subboreal Alkaline Fen

\*Type Concept: This alkaline fen vegetation contains a mossy peat layer with depths typically exceeding 40 cm, and extends across the boreal regions of North America, extending south into subboreal regions of Alaska and the Yukon Territory, the Rocky Mountains, Great Lakes, and northeastern and north-central U.S. The vegetation may be graminoid-dominated, shrub-dominated, or a patchwork of the two, with broad-leaved non-ericaceous shrubs typically dominant. There is a discontinuous to absent layer of *Sphagnum* peatmoss, with brown mosses (*Calliergon, Campylium, Drepanocladus, Tomentypnum, Scorpidium scorpioides*) present to dominant. Broad-leaved non-ericaceous shrubs such as *Alnus incana, Betula glandulosa, Betula pumila, Dasiphora fruticosa ssp. floribunda, Myrica gale, Rhamnus alnifolia, Salix barclayi* (west), *Salix candida, Salix maccalliana* (west), and other *Salix* spp. exceed the cover of ericaceous shrubs, although some shore fens may be dominated by *Chamaedaphne calyculata*. Thin-leaved graminoids include especially *Carex lasiocarpa*, as well as *Carex aquatilis* (on peat), *Carex diandra, Carex interior, Carex limosa, Carex livida, Eriophorum viridicarinatum, Muhlenbergia glomerata, Rhynchospora alba*, and *Trichophorum alpinum*. A wide diversity of herbs is found, especially *Equisetum fluviatile, Menyanthes trifoliata, Sarracenia purpurea, Solidago uliginosa* (east), *Triantha glutinosa*, and *Triglochin maritima*. Other herbs include *Comarum palustre* and *Calla palustris*.

These fens develop in open basins where lateral groundwater flows through circumneutral to calcareous parent materials or causes calcareous upwellings, creating moderately to strongly alkaline conditions. They are found on level to gently sloping surfaces, or in closed wet depressions (sometimes as floating mats), and along wetland margins and lake- and rivershores. The shore fens are occasionally flooded, and so are included here because flooding tends to create moderately alkaline conditions. Peat deposits are composed primarily of partially decomposed brown mosses and sedges. Depth of peat exceeds 40 cm, separating this from similar wetlands that are non-peatlands. The water table is at or just above the surface.

In the subboreal regions of southeastern Canada and the northeastern United States, this macrogroup is typically found in glaciated settings, in pitted outwash or in kettle lakes associated with kettle-kame-moraine topography. The characteristic species include the shrubs *Cornus amomum, Cornus racemosa, Cornus sericea, Dasiphora fruticosa ssp. floribunda*, prairie grasses such as *Andropogon gerardii* and *Spartina pectinata*, sedges including *Carex flava, Carex sterilis, Carex prairea*, and other graminoids such as *Trichophorum alpinum*, and forbs such as *Packera aurea, Symplocarpus foetidus, Triantha glutinosa*, and *Lobelia kalmii*. Less commonly, *Cladium mariscoides* may be a dominant.

In the western boreal regions of North America, this macrogroup occurs in shallow depressions and basins, pond margins, and thermokarst pits with an open hydrologic regime. Fens are nutrient-rich and have a thick peat layer that may be floating or submerged. Standing water is usually present. They are most abundant in areas of limestone bedrock, and widely scattered in areas where calcareous substrates are scarce.

\*Diagnostic Characteristics: This type contains a peat layer of partially decomposed sedges and brown mosses with depths exceeding 40 cm. Dwarf-shrubs and thin-leaved graminoids are >25%, stunted (scrub) trees <2 m with variable cover; otherwise trees <10% cover. There is a discontinuous to absent layer of *Sphagnum* peatmoss (<80% cover), with brown mosses (*Aulacomnium palustre, Calliergon, Campylium, Drepanocladus, Tomentypnum, Scorpidium scorpioides*) present to dominant. Broad-leaved non-ericaceous shrubs (*Alnus incana, Betula glandulosa, Betula pumila, Dasiphora fruticosa ssp. floribunda, Myrica gale, Rhamnus alnifolia, Salix* spp.) exceed cover of ericaceous shrubs, although some shore fens may be dominated by *Chamaedaphne calyculata*. Thin-leaved graminoids include *Carex lasiocarpa, Carex limosa, Carex livida, Carex interior, Eriophorum viridicarinatum, Muhlenbergia glomerata, Trichophorum alpinum*, and together these graminoids exceed the cover of acidic peatland graminoids indicators (*Carex magellanica ssp. irrigua, Carex oligosperma, Eriophorum vaginatum, Eriophorum virginicum, Scheuchzeria palustris*).

\*Classification Comments: This macrogroup excludes "forested fens," which have trees >2 m and >10% cover, and are treated here as rich swamps [see ~North American Boreal Conifer Poor Swamp Macrogroup (M299)$$. Both ~North American Boreal & Subboreal Bog & Acidic Fen Macrogroup (M876)$$ and this macrogroup (M877) are organic wetlands or peatlands in the Canadian wetland classification system. The Canadian system separates bogs from fens based on the influence of nutrient-rich groundwater in fens, which is missing in bogs. Here, we include poor fens with bogs, because they tend to be acidic and have a dominance of *Sphagnum* spp. in the bryophyte layer. M877 includes fens that have been classed as medium-rich to extremely rich as these have many species in common (Vitt and Chee 1990) and the bryophyte layer tends to lack the dominance of *Sphagnum* spp. found in bogs and poor fens.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M299 | North American Boreal Conifer Poor Swamp |  |
| M876 | North American Boreal & Subboreal Bog & Acidic Fen |  |
| M063 | North Pacific Bog & Fen |  |
| M061 | Eastern North American Cool Temperate Seep |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup contains a moss peat layer with depths exceeding 40 cm. Dwarf-shrubs and thin-leaved graminoids are >25%, stunted (scrub) trees <2 m with variable cover; otherwise trees <10%. There is a discontinuous to absent layer of *Sphagnum* peatmoss (<80% cover), with brown mosses present to dominant. Ericaceous dwarf-shrubs are typically minor, with broad-leaved shrubs dominant. Broad-leaved non-ericaceous shrubs exceed cover of ericaceous shrubs (>50%), although some shore fens may be more ericaceous-dominated. Thin-leaved graminoids are common. The tree layer is rare to absent (though some scrubby <2 m tall treed fens may fall within this type, with the tree layer usually dominated by *Larix laricina*).

The landscape morphology of alkaline peatlands is often very striking. A variety of approaches has been taken to describe these forms: in Maine, see Davis and Anderson (2001); in Canada, see National Wetlands Working Group (1988); and in Minnesota, see Glaser (1992a). In Canada, bog and fen peatlands each have their own set of forms. In Minnesota, Glaser treats bogs and fens together as part of larger patterned peatland complexes (mire complexes). Particularly distinctive are the ribbed bogs or fens in which a pattern of narrow (2- to 3-m wide), low (less than 1 m deep) ridges are oriented at right angles to the direction of the drainage (National Wetlands Working Group 1988). Wet pools or depressions occur between the ridges. These patterned peatlands may include string bog, Atlantic ribbed fen, or northern ribbed fen (National Wetlands Working Group 1988). They develop almost entirely north of 46°N latitude in east-central Canada and the adjacent U.S. They are minerotrophic peatlands in which the vegetation has developed into a pattern of strings (raised, usually linear features, and more acidic) and flarks (wet depressions separating the strings, and less acidic). Bedrock or other substrate influences create circumneutral to calcareous conditions. In circumneutral areas, some of the more typical bog heaths may codominate with deciduous alkaline shrubs. Alkaline peatlands usually develop in open basins and flat plains, and the patterned portion may occupy only a fraction of the entire peatland. The edge of the basin may be shallow to deep peat over a sloping substrate, where seepage waters provide nutrients.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Broad-leaved shrubs (*Alnus incana, Betula glandulosa, Betula michauxii, Betula pumila, Dasiphora fruticosa ssp. floribunda, Myrica gale, Rhamnus alnifolia, Salix* spp.) are dominant to minor, and ericaceous dwarf-shrubs, such as *Andromeda polifolia, Vaccinium oxycoccos*, and *Kalmia polifolia* are minor, but *Chamaedaphne calyculata* is occasionally dominant. Thin-leaved graminoids include especially *Carex lasiocarpa*, but also *Carex aquatilis* (on peat) *Carex chordorrhiza, Carex interior, Carex limosa, Carex livida, Eriophorum viridicarinatum, Muhlenbergia glomerata, Rhynchospora alba*, and *Trichophorum alpinum*. A wide diversity of herbs is found, especially *Drosera rotundifolia, Equisetum fluviatile, Menyanthes trifoliata, Sarracenia purpurea, Triantha glutinosa (= Tofieldia glutinosa)*, and *Triglochin maritima*. Species diversity is typically high (though shore fens may be low). Less commonly, *Calamagrostis canadensis* and *Equisetum fluviatile* may be present. Mosses include the brown mosses *Campylium stellatum, Limprichtia revolvens (= Drepanocladus revolvens), Scorpidium scorpioides*, and *Tomentypnum nitens*. *Sphagnum* spp. are patchy to absent, and may include *Sphagnum russowii, Sphagnum squarrosum* and *Sphagnum warnstorfii*, among others (Gignac 1991, Vitt et al. 1995, Harris et al. 1996, Minnesota DNR 2003).

In the subboreal regions of southeastern Canada and the northeastern and north-central United States, characteristic species include the shrubs *Cornus amomum, Cornus racemosa, Cornus sericea, Dasiphora fruticosa ssp. floribunda*, prairie grasses such as *Andropogon gerardii* and *Spartina pectinata*, sedges including *Carex flava, Carex prairea, Carex sterilis*, and other graminoids such as *Trichophorum alpinum*, and forbs such as *Packera aurea, Triantha glutinosa*, and *Lobelia kalmii*. In the western part of its range, *Carex lasiocarpa, Eriophorum angustifolium ssp. angustifolium (= Eriophorum polystachion), Parnassia glauca, Eleocharis compressa*, and *Symphyotrichum boreale (= Aster borealis)* may be common. Less commonly, *Cladium mariscoides* may be a dominant.

Trees are typically sparse in this macrogroup, though they may extend inward from natural wooded wetland borders. Common trees, even though stunted or scattered, include *Larix laricina* and (in the east) *Thuja occidentalis*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: In boreal wetlands, the general successional trend is often suggested to go from marsh to fen to treed bog. Although often true (Klinger and Short 1996), succession is not necessarily directional, and environmental conditions such as nutrient content and abundance of groundwater may prevent fens from developing into bogs (Zoltai et al. 1988). Succession may begin in ponds or low-lying wetlands formed by processes such as glacial recession and floodplain dynamics (oxbows). An organic root mat typically develops and is either anchored to the mineral soil or floating on water such as a pond's edge. Over time, peat-forming mosses and sedges may fill in the basin. As the peat layer develops, low and/or dwarf-shrubs become established. Dwarf-trees may establish on the well-developed peat and also around the margin of the peatland (e.g., Klein et al. 2005).

In the subboreal regions, some fens are kept open by grazing, and succession to heavier shrub cover may occur in the absence of grazing. The role of fire disturbance in fens needs further review.

ENVIRONMENT

Environmental Description: *Soil/substrate/hydrology:* These fens develop where lateral groundwater flows through circumneutral to calcareous parent materials or through calcareous upwellings that create moderately to strongly alkaline, saturated conditions. They are found on level to gently sloping surfaces, or in closed wet depressions (sometimes as floating mats), and along wetland margins and lake- and rivershores The shore fens are occasionally flooded, and so are included here because flooding tends to create moderately alkaline conditions. In the western boreal regions, these occur in shallow depressions and basins, pond margins, and thermokarst pits with an open hydrologic regime. Fens are nutrient-rich and have a thick peat layer that may be floating or submerged. Standing water is usually present. They are most abundant in areas of limestone bedrock, and widely scattered in areas where calcareous substrates are scarce.

DISTRIBUTION

\*Geographic Range: This macrogroup is found in scattered locations of boreal New England and Canada west to the Great Lakes and northern Minnesota and extends across the western boreal regions of Canada and the U.S., with occurrences within inland British Columbia, western Alberta, and north into Alaska and Yukon Territory.

Nations: CA, US

States/Provinces: AB, AK, BC, CT, IL, IN, MA, MB, ME, MI, MN, NB, NH, NJ, NS, NT, NY, OH, ON, PA, PE?, QC, RI, SK, VT, WA?, WI, WV, YT

USFS Ecoregions (2007) [optional]: 211A:CP, 211E:CC, 211F:CC, 211I:CC, 211J:CC, 212Ha:CCP, 212Hb:CCP, 212Hc:CCP, 212Hd:CCP, 212He:CCC, 212Hf:CCC, 212Hg:CCC, 212Hh:CCP, 212Hi:CCC, 212Hj:CCP, 212Hk:CCC, 212Hl:CCC, 212Hm:CCP, 212J:CC, 212K:CC, 212L:CC, 212M:CC, 212N:CC, 212Q:CP, 212Ra:CCP, 212Rb:CCC, 212Rc:CCC, 212Rd:CCC, 212Re:CCC, 212S:CC, 212Tb:CCC, 212Te:CCP, 212X:CC, 212Y:CC, 212Z:CC, 221A:CC, 221B:CC, 221D:CC, 221E:CC, 221Fa:CCC, 222H:CC, 222I:CC, 222Ja:CCC, 222Jb:CCC, 222Jc:CCC, 222Je:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222K:CC, 222M:CC, 222R:CC, 222Ua:CCP, 222Ud:CCC, 222Ue:CCC, 251B:CC, M211A:CP, M211B:CP, M211C:CC, M242D:??

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G185 | Eastern North American Subboreal Alkaline Fen |
| G183 | Midwest Prairie Alkaline Fen |
| G516 | Rocky Mountain Alkaline Fen |
| G361 | Western North American Boreal Alkaline Fen |
| G804 | Eastern North American Boreal Alkaline Fen |
| G805 | North-Central Interior & Appalachian Alkaline Fen |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-11-18 | M064 Carex limosa - Eleocharis quinqueflora - Carex buxbaumii Rocky Mountain Fen Macrogroup | M064 split into M876 & M877 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Fen Wetland Class | National Wetlands Working Group 1988 |  |
| > | Peatlands | Mitsch and Gosselink 2000 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: National Wetlands Working Group (1988)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Faber-Langendoen, G. Kittel, M. Reid, M. Hall, K. Boggs, T. Boucher, S.C. Gawler

Acknowledgments [optional]:

Version Date: 29 Mar 2017

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2. Shrub & Herb Vegetation

2.C.2.Na. North American Bog & Fen

M063. North Pacific Bog & Fen

Type Concept Sentence: This macrogroup contains alkaline, acidic, and neutral peatlands (fens and bogs) that occur throughout southern Alaska (including the Aleutian Islands), maritime British Columbia, Washington, Oregon, and northern California. The vegetation is low-shrub or graminoid physiognomy, or stunted coastal Pacific tree species, and nearly all examples have a moss-dominated ground layer.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.2.Na. North American Bog & Fen (D029)

Elcode: M063

\*Scientific Name: *Pinus contorta var. contorta / Ledum groenlandicum / Carex cusickii* North Pacific Bog & Fen Macrogroup

\*Common (Translated Scientific) Name: Beach Pine / Bog Labrador-tea / Cusick's Sedge North Pacific Bog & Fen Macrogroup

\*Colloquial Name: North Pacific Bog & Fen

\*Type Concept: This macrogroup contains acidic to alkaline peatlands (bogs and fens) with low-growing shrubs, stunted trees, or dense herbaceous structure, or a mosaic of physiognomic types; nearly all have a moss-dominated ground layer. Indicator shrub and herbaceous species include *Betula nana, Carex aquatilis, Carex cusickii, Carex limosa, Carex livida, Carex utriculata, Comarum palustre, Kalmia microphylla, Ledum* spp., *Menyanthes trifoliata, Myrica gale, Salix pulchra, Spiraea douglasii*, and many others. The ground layer is usually very thick with *Sphagnum* moss or "brown mosses" such as *Campylium, Drepanocladus, Scorpidium, Tomentypnum*, and *Warnstorfia*. Stunted tree species present may include *Callitropsis nootkatensis, Pinus contorta var. contorta, Picea sitchensis, Thuja plicata*, and/or *Tsuga heterophylla*. This macrogroup occurs throughout southern Alaska (including the Aleutian Islands), maritime British Columbia, Washington, Oregon, and northern California. This includes lowlands such as the Puget Sound lowlands and higher montane and subalpine elevations in the coastal mountains, the Sierra Nevada, and the Klamath-Siskiyou mountains. The macrogroup is not limited to coastal/maritime areas. Elevations are mostly under 457 m (1500 feet). The macrogroup includes well-developed bogs, raised bogs, "poor" (aka acidic) and "rich" (aka alkaline), as well as neutral fens. Soils are deep (>40 cm) organic, and are usually saturated throughout the growing season. Sites include serpentine- and ultramafic-influenced peatlands in northern California. Water sources include mineral-rich groundwater (fens) to only that of precipitation (bogs).

\*Diagnostic Characteristics: Saturated organic soils >40 cm deep; ground layer dominated by *Sphagnum* spp., brown mosses or liverworts. Dominance by indicator species, including *Betula nana, Carex aquatilis, Carex cusickii, Carex limosa, Carex livida, Carex utriculata, Comarum palustre, Kalmia polifolia, Ledum* spp., *Menyanthes trifoliata, Myrica gale, Salix pulchra*, and *Spiraea douglasii*. The distinctive scrubby tree species present may include *Callitropsis nootkatensis, Pinus contorta var. contorta, Picea sitchensis, Thuja plicata*, and/or *Tsuga heterophylla*.

\*Classification Comments: These peatlands are distinguished from boreal and interior continental bogs and fens by the presence of Pacific coastal species and a maritime-moderated climate. Its primary distinctiveness relative to boreal peatlands and Rocky Mountain peatlands appears to be from the distinctive tree composition of the scrub layer. Further review is needed. Its occurrence in western Nevada should be checked, as sites may be more similar to Rocky Mountain fens (J. Rocchio pers. comm. 2014). If this macrogroups is accepted as distinct from former Rocky Mountain Fen Macrogroup (M064) [subsequently split into ~North American Boreal & Subboreal Bog & Acidic Fen Macrogroup (M876)$$ and ~North American Boreal & Subboreal Alkaline Fen Macrogroup (M877)$$], then it may need to be listed for northwestern Montana and parts of northern Idaho (L. Vance pers. comm. 2014).

Some ecologists would have liked to lump ~North Pacific Bog & Fen Macrogroup (M063)$$ with former Rocky Mountain Fen Macrogroup (M064), as the species composition can be very similar. There are several reasons to keep them separate: (a) the bogs and fens of M063 have a warmer climate, with maritime influences in some areas, and therefore have higher rates of growth and decomposition, and M063 is a more dynamic macrogroup than this colder Rocky Mountain counterpart; (b) montane fens in the North Pacific may have more floristic overlap with M064, but the lowlands of M063 are floristically distinct due to maritime climate and occurrence of ombrotrophic bogs which are not found in M064; and (c) Sierra Nevada fens in California should be placed here in M064.

Within the macrogroup, there are three main types of fens by water chemistry: (1) alkaline or "rich" fens (pH >~6.5 or 7.0), generally associated with calcareous bedrock; (2) intermediate fens (pH ~5.0-6.5), generally associated with granitic bedrock, which represent the majority of our fens; and (3) acidic fens (pH <~5.0). The acidic fens have sometimes been called poor fens, but that doesn't quite fit because they can have very high ionic concentrations. Our most acidic fens are associated with geologic sources of acid, either from iron pyrite (iron fens) or geothermal venting (geothermal fens). The fens that are most similar to classic "poor" fens are best considered as the low pH end of the intermediate fen category and are most often basin fens in granite landscapes where there is little input of ions (J. Lemly pers. comm. 2014).

This is a reasonable macrogroup to be separated from boreal/subboreal and Vancouverian fens and bogs. However, the species of these fens can be wide-ranging, at least in the Pacific Northwest. It is true, as noted, that the coastal fens are under a milder climate--if you look at MacKenzie and Moran (2004), the Wf associations between coastal and interior areas are mostly a difference in *Carex aquatilis var. dives (= Carex sitchensis)* (Kartesz 1999) versus *Carex aquatilis*, which are combined by some. However, the acidic fens for the Pacific maritime areas include some of the British Columbia "bogs" and here there are additional species to characterize the Pacific area--and in the hypermaritime, the acidic fen-bogs are extensive, and can occur on quite steep slopes and in unusual slope positions (crests). They are unique in a global perspective and likely warrant recognition at a high level of the classification. As noted, the environmental drivers are also quite different between these extensive coastal bog-fens and fens of the interior (D. Meidinger pers. comm. 2014).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M877 | North American Boreal & Subboreal Alkaline Fen | includes alkaline peatlands (circumneutral to alkaline fens) that occur in much colder climates of the north and interior, relative to members of M063, which have a more moderate maritime-influenced climate, but M877 currently includes Atlantic maritime climates. |
| M876 | North American Boreal & Subboreal Bog & Acidic Fen | includes acidic peatlands (bogs and poor fens) that occur in much colder climates of the north and interior relative to members of M063, which have a more moderate maritime-influenced climate, but M876 currently includes Atlantic maritime climates. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Vegetation is predominantly dwarf-shrubs or herbaceous (vascular or nonvascular) plants with a moss-dominated ground layer. Stunted trees may be present or a mosaic of patches of stunted trees amongst the mostly herbaceous area.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Acidic fen herbaceous species include *Carex anthoxanthea, Carex aquatilis var. dives (= Carex sitchensis), Carex limosa, Carex pauciflora, Carex pluriflora, Comarum palustre, Cornus canadensis, Dodecatheon pulchellum, Drosera rotundifolia, Geum calthifolium, Nephrophyllidium crista-galli, Parnassia kotzebuei, Rubus chamaemorus*, and *Sanguisorba menziesii*. Moss species include *Sphagnum fuscum, Sphagnum austinii, Sphagnum henryense, Sphagnum pacificum, Sphagnum papillosum, Sphagnum rubellum, Sphagnum mendocinum*, and *Philonotis fontana var. americana*. Liverworts include species of *Nardia, Marsupella*, and *Scapania*. Shrub species include *Andromeda polifolia, Betula nana, Empetrum nigrum, Kalmia microphylla, Ledum groenlandicum, Ledum palustre ssp. decumbens, Myrica gale, Salix pulchra, Vaccinium cespitosum, Vaccinium oxycoccos*, and *Vaccinium uliginosum*. Stunted (<5 m) tree species, if present, include *Callitropsis nootkatensis (= Cupressus nootkatensis), Picea sitchensis, Pinus contorta var. contorta, Pinus monticola, Thuja plicata, Tsuga heterophylla*, or *Tsuga mertensiana*.

Neutral to alkaline fens may have brown mosses such as *Campylium, Drepanocladus, Scorpidium, Tomentypnum*, and *Warnstorfia*. Indicator species include *Betula nana, Carex aquatilis, Carex cusickii, Carex lasiocarpa, Carex livida, Carex utriculata, Comarum palustre, Menyanthes trifoliata, Myrica gale, Spiraea douglasii*. Trees may be present at the edges or on raised hummocks where soils are not anoxic and include *Tsuga heterophylla, Thuja plicata, Callitropsis nootkatensis, Pinus contorta var. contorta*, and/or *Picea sitchensis*.

Along the coast, *Pinus contorta* does not occur north of Juneau in southeastern Alaska; however, further inland it does occur much farther north in the Yukon Territory. Treed bogs in the Pacific Northwest have mostly *Pinus contorta var. contorta* or *Callitropsis nootkatensis* but can include some *Tsuga heterophylla, Tsuga mertensiana*, or *Thuja plicata*. *Ledum groenlandicum* is generally the dominant shrub understory species; other shrubs include *Vaccinium uliginosum, Juniperus communis, Myrica gale*, or *Gaultheria shallon*. Low-shrub species include *Empetrum nigrum, Kalmia microphylla*, and *Rubus chamaemorus*. Herbaceous species include sedges such as *Eriophorum angustifolium, Trichophorum cespitosum, Carex livida*, or herbs such as *Sanguisorba officinalis, Triantha glutinosa*, or *Drosera rotundifolia*. Dominant bryophytes include *Sphagnum* spp. and *Racomitrium lanuginosum*.

Floristic information was summarized from the following sources: Shacklette et al. (1969), Knight et al. (1970), Thorne (1976), Sawyer et al. (1978), Slack (1979), Eyre (1980), Kruckeberg (1984), Banner et al. (1986, 1988, 1993), Keeler-Wolf (1986), Sawyer (1986), DeMeo et al. (1992), Viereck et al. (1992), Kunze (1994), Talbot and Talbot (1994), Jimerson et al. (1995), Martin et al. (1995), Shephard (1995), DeVelice et al. (1999), Boggs et al. (2003, 2008a, 2008b), Kagan et al. (2004), MacKenzie and Moran (2004), Talbot et al. (2006), and Fleming and Spencer (2007).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Natural disturbance events along north coastal peatlands play an important role in slowing and reducing organic matter accumulation on specific types of sites. The main types of natural disturbance are landslides, windthrow, and fluvial activity (Banner et al. 2005). Peatlands on steep slopes experience landslides and windthrow events which tend to mix soil and slow the buildup of organic layers. On more gentle terrain, disturbance is less frequent, which allows for a deep accumulation of organic matter. Disturbance here is of small and localized scale. Large-scale disturbance such as major blowdown or severe fire are infrequent (>1000 years).

Fire, when it does occur, stimulates growth of mosses that prefer bare substrates, and starts the successional sequence of different mosses and vascular plants. Fires also increase nutrient availability and may temporarily create a carbon sink. Fire scars on stumps within herbaceous bogs and fens have been observed, pointing to a need for more study (Banner et al. 2005, J. Rocchio pers. comm. 2013). It has been documented that Native Americans burned herbaceous wetlands of the Olympic Peninsula annually to keep trees from invading wetland openings (Anderson 2009).

In addition to disturbance, there are natural cycles and interplay between the advancement and retreat of peat levels (the buildup of peat that alters depth of rooting zone relative to groundwater, or decrease in peat depth from an increase decomposition due to drought) and encroachment peat into surrounding uplands (paludification) or the reverse, surrounding upland species that may shade out moss species. Generally, the greatest (annually measurable) change generally occurs on the edges of fens and bogs and at the tops of hummocks. These small-scale dynamics depend on the type of wetland and specific local site characteristics that cannot be generalized in a group description. Some examples are given here. In Alaska, species that dominate the early stages of succession in newly formed ponded basins include *Equisetum variegatum, Equisetum fluviatile*, and *Comarum palustre*, while *Sphagnum* species invade the surface and help in forming peat. Acidic and nutrient-poor-tolerant vascular species eventually dominate such sites, including *Myrica gale, Empetrum nigrum, Vaccinium uliginosum, Andromeda polifolia*, and *Vaccinium oxycoccos*. The late-successional stage of a peatland supports various community types, depending on the pH, waterflow, and nutrient status of a site, such as *Myrica gale / Empetrum nigrum* and *Picea sitchensis / Sphagnum* plant associations. Peat buildup, patterned ground, and changes in water table are recurrent aspects of peatland development rather than unidirectional successional events. For this reason it is unlikely that any of the late-seral peatland communities are stable in the sense of climax vegetation (K. Boggs and T. Boucher pers. comm. 2008). In Washington, some fens can be indefinitely maintained by groundwater discharge; sometimes succession from rich fen to poor fen/bog may occur in these situations but often is dependent on water chemistry and level of discharge and fire (J. Rocchio pers. comm. 2012).

Treed bogs of the Pacific Northwest represent forests with soils that have taken hundreds to thousands of years to develop, a topoedaphic climax that is relatively stable over time. Tree regeneration frequently occurs on raised organic microsites on the remains of previous trees. Tree growth is very slow. Longer-term succession is probably influenced by paludification and climatic patterns that dictate drainage, either favoring poorer drainage, increased tree mortality, and more open canopy; or improved drainage, greater tree growth, and a more closed canopy. These patterns can also favor individual tree species based on their tolerance or intolerance of wet soils. The widespread yellow-cedar decline, which covers 200,000 ha in southeastern Alaska, is an example of a climate-induced tree death that has resulted in a composition shift away from yellow-cedar due to this mortality (Hennon et al. 2008). Windthrow can cause soil mixing that reverses the paludification processes on a small scale, where productivity may be increased (Banner et al. 2005).

ENVIRONMENT

Environmental Description: Soils are deep (>40 cm), organic, and are usually saturated throughout the growing season. Organic soil may overlay mineral soils and may be floating or submerged. Fens are alkaline, neutral and acidic. This macrogroup also includes bogs, deep peatlands that do not interact with groundwater. Peatland elevations are mostly under 457 m (1500 feet), and annual precipitation ranges from 890-3050 mm (35-120 inches); however, some types occur higher than 500 m (1650 feet). Within Washington, they are prominent within areas affected by continental and alpine glaciation, especially in the Puget Basin where glaciation has left kettle and glacial scours that currently support bogs and basin fens (J. Rocchio pers. comm. 2014). In Alaska hypermaritime site organic soils are characterized by an abundance of sodium cations from oceanic spray. Soils are deep (>40 cm), organic, acidic (pH <5.5) and are usually saturated throughout the growing season. Organic soil may overlay mineral soils and may be floating or submerged. Alkaline and acidic fens can be intermixed with bogs. California fens have a more Mediterranean climate of hot summers and mild, cool winters. Some fens occur on serpentine and ultramafic soils. Fens occur in river valleys, in basins, around lakes and marshes, or on gentle to steep slopes. These wetlands are relatively abundant in Alaska and British Columbia but diminish rapidly in size and number farther south. They occur in river valleys, around lakes and marshes or on slopes. Treed bogs and poor fens may grade into drier upland forest on mineral soil, or adjacent shrubland or herbaceous poor fen and bogs, or grade into wetter non-treed fens, which have richer soil water (higher pH).

Environmental information was summarized from the following sources: Shacklette et al. (1969), Knight et al. (1970), Thorne (1976), Sawyer et al. (1978), Slack (1979), Eyre (1980), Kruckeberg (1984), Banner et al. (1986, 1988, 1993), Keeler-Wolf (1986), Sawyer (1986), DeMeo et al. (1992), Viereck et al. (1992), Kunze (1994), Talbot and Talbot (1994), Jimerson et al. (1995), Martin et al. (1995), Shephard (1995), DeVelice et al. (1999), Boggs et al. (2003, 2008a, 2008b), Kagan et al. (2004), MacKenzie and Moran (2004), Cooper and Wolf (2006), Talbot et al. (2006), and Fleming and Spencer (2007).

DISTRIBUTION

\*Geographic Range: This wetland type is relatively abundant in southeastern Alaska and maritime British Columbia but diminishes rapidly in size and number farther south. It includes peatlands along the Pacific coast from the Aleutian Islands, Alaska Peninsula, Kodiak Islands, southern and southeastern coastal Alaska, coastal British Columbia south to northern California. It also includes peatlands found in the Puget Sound lowlands, in the coastal mountains and montane to subalpine elevations of the Cascades and the Klamath-Siskiyou mountains.

Nations: CA, US

States/Provinces: AK, BC, CA, OR, WA

USFS Ecoregions (2007) [optional]: 242A:CC, 242B:CP, 341D:PP, 342C:P?, 342H:PP, M242A:CC, M242B:CC, M242C:CC, M242D:CC, M261A:CC, M261B:C?, M261D:C?, M261E:CC, M332G:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G285 | North Pacific Alkaline Open Fen |
| G284 | North Pacific Acidic Open Bog & Fen |
| G610 | North Pacific Maritime Wooded Bog & Poor Fen |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Peatlands | Barbour and Billings 2000 | Discusses only boreal peatlands, but concept is the same, on a smaller scale for Pacific coast lowlands and montane bogs and fens with floristics that are similar but also with regional differences. |
| > | Peatlands | Mitsch and Gosselink 2000 | Discusses only boreal peatlands, but concept is the same, on a smaller scale for Pacific coast lowlands and montane bogs and fens with floristics that are similar but also with regional differences. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Kittel, M. Reid, K. Boggs, and T. Boucher, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel and D. Meidinger

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by K. Boggs, T. Boucher, and T. Keeler-Wolf.

Version Date: 29 Mar 2017

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2. Shrub & Herb Vegetation

2.C.2.Nb. Atlantic & Gulf Coastal Plain Pocosin

D324. Atlantic & Gulf Coastal Plain Pocosin

Type Concept Sentence: The saturated wetland evergreen shrub vegetation of this division typically occurs in large peatlands called pocosins on the Southeastern Coastal Plain and is dominated by characteristic shrubs, which include *Cyrilla racemiflora, Ilex coriacea, Ilex glabra, Lyonia lucida*, and *Zenobia pulverulenta*, along with the evergreen vine *Smilax laurifolia*.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.2.Nb. Temperate to Polar Bog & Fen (F016)

Elcode: D324

\*Scientific Name: *Lyonia lucida - Ilex glabra - Cyrilla racemiflora* Shrub Peatland Division

\*Common (Translated Scientific) Name: Shining Fetterbush - Inkberry - Swamp Titi Shrub Peatland Division

\*Colloquial Name: Atlantic & Gulf Coastal Plain Pocosin

\*Type Concept: The vegetation of this wetland division is predominantly dense shrubland. Primarily evergreen shrubs and *Smilax laurifolia* vines dominate. The characteristic shrubs include *Cyrilla racemiflora, Ilex coriacea, Ilex glabra, Lyonia lucida*, and *Zenobia pulverulenta*, which occur along with *Smilax laurifolia*. The most characteristic tree is *Pinus serotina*; other scattered trees include *Gordonia lasianthus, Magnolia virginiana*, and *Persea palustris*. Herbs are scarce, but small patches dominated by *Woodwardia virginica, Carex striata, Sarracenia flava*, and *Sarracenia purpurea* are frequent in some examples. Mosses such as *Sphagnum* spp. may be common in patches. Under pre-European settlement fire regimes, stands of *Arundinaria tecta* (canebrakes) would have been more common and extensive, and herbaceous patches would have been more extensive. The vegetation of this division includes wetlands of organic soils, occurring on broad flats or gentle basins, primarily on the outer terraces of the Atlantic Coastal Plain of the Carolinas and southeastern Virginia, and also parts of the Atlantic and Gulf coastal plains further south and west to Georgia and Alabama and possibly Mississippi. Soil saturation, sheetflow, and peat depth create a distinct gradient in structure within pocosins, with the tallest statured woody vegetation on the edges and shortest in the center. Catastrophic fires are important in this division, naturally occurring at moderate frequency. Fires generally burn all above-ground vegetation in large patches, creating a shifting mosaic. Vegetation structure and biomass recover rapidly in most of the burned areas, primarily by sprouting. In the Upper East Gulf Coastal Plain of Alabama, adjacent Georgia, and possibly Mississippi, the wetlands generally occur in small patches on slopes within a matrix of *Pinus palustris*-dominated vegetation. Wetland conditions are maintained by seepage flow from adjacent uplands. Examples of this division can vary between densely shrubby and fairly open and herbaceous, depending on frequency of fire and amount of elapsed time since the previous fires.

\*Diagnostic Characteristics: *Cyrilla racemiflora, Ilex coriacea, Ilex glabra, Lyonia lucida*, and *Zenobia pulverulenta*, are the most characteristic evergreen shrubs. Other shrubs of the heath family (Ericaceae) are common. The evergreen vine *Smilax laurifolia* is found in many examples. *Pinus serotina* is present at very low cover in some examples. This vegetation is typical of pocosin wetlands.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D062 | Southeastern North American Flooded & Swamp Forest | is tree-dominated. |
| D029 | North American Bog & Fen |  |
| D322 | Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland | rarely has evergreen shrubs. |

Similar NVC Types General Comments [optional]: This shrubland division has floristic, environmental, and site similarities to the forested swamp division D062, but the physiognomy separates the two divisions. D062 is dominated by trees, whereas this division is shrub-dominated. This vegetation is also distinguished from 2.C.4.Ne ~Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland Division (D322)$$ by having mostly broadleaf evergreen shrubs.

VEGETATION

Physiognomy and Structure Summary: The vegetation included in this division is evergreen shrub-dominated. Some associations may have widely scattered needle-leaved trees. The vegetation may vary in height depending on the fire-return interval. The habitats are influenced by high water tables and organic soils.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The vegetation of this division is typically found in large wetlands called pocosins. The communities have in common a dense shrub layer of wetland shrubs tolerant of the organic soils, low nutrient conditions, and fire. *Arundinaria tecta (= Arundinaria gigantea ssp. tecta), Cyrilla racemiflora, Ilex coriacea, Ilex glabra, Lyonia lucida, Lyonia mariana, Morella cerifera (= Myrica cerifera var. cerifera), Symplocos tinctoria*, and *Zenobia pulverulenta* are characteristic and usually dominant in some combination, along with *Smilax laurifolia*. *Pinus serotina* is the characteristic tree, and it along with a set of evergreen hardwoods, including *Gordonia lasianthus, Magnolia virginiana*, and *Persea palustris*, are generally the only trees present. Under pre-European settlement fire regimes, stands of *Arundinaria tecta* (canebrakes) would have been more common and extensive. Component communities tend to be low in plant species richness, and woody species richness exceeds herbaceous in most associations, with herbs being limited to small open patches. Some herbs may include *Woodwardia virginica* and *Carex striata var. striata*. The physiognomy, in terms of vegetation height and density, is variable, depending on fire history, and can vary from densely shrubby to herbaceous. In current condition, most examples are shrubby, but may have scattered trees.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: Vegetation of this division occurs on broad interfluvial flats and in small to large, very gentle basins and swales, largely on the outermost terraces of the Outer Coastal Plain. Some occurrences are in large to small peat-filled Carolina bays (Bennett and Nelson 1991). Smaller patches occur in shallow swales associated with relict coastal dune systems or other irregular sandy surfaces. Soils range from wet mineral soils with mucky surface layers to peats several meters deep. Most of the largest occurrences are domed peatlands with the deepest peat associated with topographic highs in the center, but deep peats are also associated with buried drainage channels. Hydrology is driven by rainfall and sheetflow. The low hydraulic conductivity of the organic material limits interaction with the groundwater. The raised center of domed peatlands is fed only by rainwater and is therefore a true ombrotrophic bog. More peripheral portions are fed by sheetflow from the center, and so receive only acidic water low in nutrients. Occurrences in Carolina bays and other basins appear to be similarly isolated from surface or groundwater inflow from adjacent areas. Soils are normally saturated throughout the winter and well into the growing season, though the organic material may dry enough to burn during droughts. Standing water is limited to local depressions and disturbed areas. Soil saturation and peat depth, with its corresponding nutrient limitation, are the primary drivers of vegetational zonation, as well as the distinction between this division and adjacent ones, but their effect may be modified by drainage patterns. In the Upper East Gulf Coastal Plain, examples may be found along steep to gentle slopes in the historically longleaf pine-dominated landscape.

DISTRIBUTION

\*Geographic Range: Vegetation of this division ranges through the southern coastal plains, being most prevalent in peatland regions of North Carolina, and extending into northern South Carolina and southeastern Virginia, extending in the Gulf Coastal Plain and the Upper East Gulf Coastal Plain from Florida to Louisiana.

Nations: US

States/Provinces: AL, FL, GA, LA, MS, NC, SC, VA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M065 | Southeastern Coastal Bog & Fen |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D. Faber-Langendoen, in Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne, C.W. Nordman and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 03 Dec 2015

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2. Shrub & Herb Vegetation

2.C.2.Nb. Atlantic & Gulf Coastal Plain Pocosin

M065. Southeastern Coastal Bog & Fen

Type Concept Sentence: The saturated wetland evergreen shrub vegetation of this macrogroup typically occurs in large peatlands called pocosins on the Southeastern Coastal Plain and is dominated by characteristic shrubs which include *Cyrilla racemiflora, Ilex coriacea, Ilex glabra, Lyonia lucida*, and *Zenobia pulverulenta*, which occur along with the evergreen vine *Smilax laurifolia*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.2.Nb. Atlantic & Gulf Coastal Plain Pocosin (D324)

Elcode: M065

\*Scientific Name: *Lyonia lucida - Ilex glabra - Cyrilla racemiflora* Bog & Fen Macrogroup

\*Common (Translated Scientific) Name: Shining Fetterbush - Inkberry - Swamp Titi Bog & Fen Macrogroup

\*Colloquial Name: Southeastern Coastal Bog & Fen

\*Type Concept: The vegetation of this wetland macrogroup is predominantly dense shrubland. Primarily evergreen shrubs and *Smilax laurifolia* vines dominate. The characteristic shrubs include *Cyrilla racemiflora, Ilex coriacea, Ilex glabra, Lyonia lucida*, and *Zenobia pulverulenta*, which occur along with *Smilax laurifolia*. The most characteristic tree is *Pinus serotina*; other scattered trees include *Gordonia lasianthus, Magnolia virginiana*, and *Persea palustris*. Herbs are scarce, but small patches dominated by *Woodwardia virginica, Carex striata, Sarracenia flava*, and *Sarracenia purpurea* are frequent in some examples. Mosses such as *Sphagnum* spp. may be common in patches. Under pre-European settlement fire regimes, stands of *Arundinaria tecta* (canebrakes) would have been more common and extensive, and herbaceous patches would have been more extensive. The vegetation of this macrogroup includes wetlands of organic soils, occurring on broad flats or gentle basins, primarily on the outer terraces of the Atlantic Coastal Plain of the Carolinas and southeastern Virginia, and also parts of the Atlantic and Gulf coastal plains further south and west to Georgia and Alabama and possibly Mississippi. Soil saturation, sheetflow, and peat depth create a distinct gradient in structure within pocosins, with the tallest statured woody vegetation on the edges and shortest in the center. Catastrophic fires are important in this macrogroup, naturally occurring at moderate frequency. Fires generally burn all above-ground vegetation in large patches, creating a shifting mosaic. Vegetation structure and biomass recover rapidly in most of the burned areas, primarily by sprouting. In the Upper East Gulf Coastal Plain of Alabama, adjacent Georgia, and possibly Mississippi, the wetlands generally occur in small patches on slopes within a matrix of *Pinus palustris*-dominated vegetation. Wetland conditions are maintained by seepage flow from adjacent uplands. Examples of this macrogroup can vary between densely shrubby and fairly open and herbaceous, depending on frequency of fire and amount of elapsed time since the previous fires.

\*Diagnostic Characteristics: *Cyrilla racemiflora, Ilex coriacea, Ilex glabra, Lyonia lucida*, and *Zenobia pulverulenta*, are the most characteristic evergreen shrubs. Other shrubs of the heath family (Ericaceae) are common. The evergreen vine *Smilax laurifolia* is found in many examples. *Pinus serotina* is present at very low cover in some examples. This vegetation is typical of pocosin wetlands.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M032 | Southern Coastal Plain Evergreen Hardwood - Conifer Swamp | is tree-dominated. |
| M067 | Atlantic & Gulf Coastal Plain Wet Prairie & Marsh |  |

Similar NVC Types General Comments [optional]: This shrubland macrogroup has floristic, environmental, and site similarities to the forested swamp macrogroup M032, but the physiognomy separates the two macrogroups. M032 is dominated by trees and M065 is shrub-dominated. This vegetation is also distinguished from ~Atlantic & Gulf Coastal Plain Pondshore & Wet Prairie Group (G111)$$ by its dominance by mostly broadleaf evergreen shrubs.

VEGETATION

Physiognomy and Structure Summary: The vegetation included in this macrogroup is evergreen shrub-dominated. Some associations may have widely scattered needle-leaved trees. The vegetation may vary in height depending on the fire-return interval. The habitats are influenced by high water tables and organic soils.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The vegetation of this macrogroup is typically found in large wetlands called pocosins. The communities have in common a dense shrub layer of wetland shrubs tolerant of the organic soils, low nutrient conditions, and fire. *Arundinaria tecta (= Arundinaria gigantea ssp. tecta), Cyrilla racemiflora, Ilex coriacea, Ilex glabra, Lyonia lucida, Lyonia mariana, Morella cerifera (= Myrica cerifera var. cerifera), Symplocos tinctoria*, and *Zenobia pulverulenta* are characteristic and usually dominant in some combination, along with *Smilax laurifolia*. *Pinus serotina* is the characteristic tree, and it along with a set of evergreen hardwoods, including *Gordonia lasianthus, Magnolia virginiana*, and *Persea palustris*, are generally the only trees present. Under pre-European settlement fire regimes, stands of *Arundinaria tecta* (canebrakes) would have been more common and extensive. Component communities tend to be low in plant species richness, and woody species richness exceeds herbaceous in most associations, with herbs being limited to small open patches. Some herbs may include *Woodwardia virginica* and *Carex striata var. striata*. The physiognomy, in terms of vegetation height and density, is variable, depending on fire history, and can vary from densely shrubby to herbaceous. In current condition, most examples are shrubby, but may have scattered trees.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Under current conditions, the vegetation is predominantly dense shrubland. Herbaceous plants are present only as small patches. Vegetation is typically zoned. The vegetation of pocosins is zoned, with the lowest statured vegetation in the center, with woodlands on the edges and in the smaller occurrences. Under pre-European settlement fire regimes, stands of *Arundinaria tecta* (canebrakes) would have been more common and extensive. Fire is an important factor in these systems, with the pre-settlement fire regime probably being very different from that observed under current conditions. Natural fire-return intervals are not well-known, but are probably on the order of one to five or more decades in the wettest areas. Peripheral areas may be subject to fire as often as the surrounding vegetation burns, which may naturally have been an average of 3 years. Fires are typically intense due to density and flammability of the vegetation, killing all above-ground vegetation. They are followed by vigorous root sprouting by shrubs and hardwoods, leading to recovery of standing biomass within a few years. *Pinus serotina* recovers by epicormic sprouting or by regeneration from seeds released from serotinous cones. Fires during droughts may ignite peat, forming holes that take longer to recover. Herb-dominated openings in pocosins may depend on peat fires, though this is not well-documented. Natural fires occur in large patches, creating a shifting patch structure that interacts with the vegetational zonation created by peat depth. The intensity of fire in these systems makes fire control difficult; prescribed burning is seldom done, and wild fires continue to be a significant influence. The larger peatlands are believed to have been created by paludification following natural blocking of drainage (Otte 1981). Peat buildup raises the water table in the center, creating the domed structure of the largest peatlands and allowing the wetland to spread out as wetness is increased at the edges. Deeper pocosin peats contain fossil logs that indicate dominance by a swamp forest in past millennia. Otte (1981) noted that peat fires likely limit the height to which the peat can accumulate, in proportion to how high it can raise the local water table. The dominance of mostly broadleaf evergreen shrubs as opposed to a canopy of deciduous hardwoods distinguishes this macrogroup from nonriverine swamp forests.

ENVIRONMENT

Environmental Description: Vegetation of this macrogroup occurs on broad interfluvial flats and in small to large, very gentle basins and swales, largely on the outermost terraces of the Outer Coastal Plain. Some occurrences are in large to small peat-filled Carolina bays (Bennett and Nelson 1991). Smaller patches occur in shallow swales associated with relict coastal dune systems or other irregular sandy surfaces. Soils range from wet mineral soils with mucky surface layers to peats several meters deep. Most of the largest occurrences are domed peatlands with the deepest peat associated with topographic highs in the center, but deep peats are also associated with buried drainage channels. Hydrology is driven by rainfall and sheetflow. The low hydraulic conductivity of the organic material limits interaction with the groundwater. The raised center of domed peatlands is fed only by rainwater and is therefore a true ombrotrophic bog. More peripheral portions are fed by sheetflow from the center, and so receive only acidic water low in nutrients. Occurrences in Carolina bays and other basins appear to be similarly isolated from surface or groundwater inflow from adjacent areas. Soils are normally saturated throughout the winter and well into the growing season, though the organic material may dry enough to burn during droughts. Standing water is limited to local depressions and disturbed areas. Soil saturation and peat depth, with its corresponding nutrient limitation, are the primary drivers of vegetational zonation, as well as the distinction between this macrogroup and adjacent ones, but their effect may be modified by drainage patterns. In the Upper East Gulf Coastal Plain, examples may be found along steep to gentle slopes in the historically longleaf pine-dominated landscape.

DISTRIBUTION

\*Geographic Range: Vegetation of this macrogroup ranges through the southern coastal plains, being most prevalent in peatland regions of North Carolina, and extending into northern South Carolina and southeastern Virginia, extending in the Gulf Coastal Plain and the Upper East Gulf Coastal Plain from Florida to Louisiana.

Nations: US

States/Provinces: AL, FL, GA, LA, MS, NC, SC, VA

USFS Ecoregions (2007) [optional]: 232C:CC, 232I:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G186 | Southeastern Coastal Pocosin & Shrub Bog |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| ? | Bay Forest | Bennett and Nelson 1991 |  |
| < | Pocosin | Bennett and Nelson 1991 |  |
| = | Pocosins | Christensen 2000 |  |
| = | Pocosins | Richardson and Gibbons 1993 |  |
| >< | Pond Pine Woodland | Bennett and Nelson 1991 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne and C.W. Nordman

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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Sharitz, R. R., and J. W. Gibbons. 1982. The ecology of southeastern shrub bogs (pocosins) and Carolina bays: A community profile. USDI Fish & Wildlife Service, Office of Biological Service. FWS/OBS-82/O4. Washington, DC. 93 pp.

2.C.3. Tropical Freshwater Marsh, Wet Meadow & Shrubland

Tropical Freshwater Marsh, Wet Meadow & Shrubland includes freshwater wet meadows, shallow and deep emergent marshes, with the upper limits of salinity at 0.5 ppt, above which it is considered saltwater. The vegetation comprises evergreen emergent aquatic macrophytes, chiefly graminoids such as rushes, reeds, grasses and sedges, and shrubs and other herbaceous species such as broad-leaved emergent macrophytes, floating-leaved and submergent species, and nonvascular plants such as brown mosses, liverworts, and macroscopic algae. It is found widely throughout wetland habitats of the tropical latitudes, from the equator to about 23°N and S.

2. Shrub & Herb Vegetation

2.C.3.Ef. Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland

D262. Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.3.Ef. Tropical Freshwater Marsh, Wet Meadow & Shrubland (F030)

Elcode: D262

\*Scientific Name: Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland Division

\*Common (Translated Scientific) Name: Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland Division

\*Colloquial Name: Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D322 | Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BS, BZ, CO, CR, CU, DO, EC, GD, GP, GT, HN, HT, JM, MQ, MS, NI, PA, PR, SV, TT, US, VC, VG, VI, XC, XD

States/Provinces: FL

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M710 | Caribbean Freshwater Marsh, Wet Meadow & Shrubland |
| M711 | Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland |
| M891 | Caribbean-Mesoamerican Ruderal Freshwater Marsh, Wet Meadow & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-17 | D018 Neotropical Freshwater Marsh, Wet Meadow & Shrubland Division | redundant |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ef. Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland

M710. Caribbean Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence: Freshwater marsh communities of this macrogroup encompass south Florida's freshwater marshes and wet prairies, flooded open palm savannas from Cuba, grass marshes that are part of large coastal wetlands in Cuba, Puerto Rico, and Trinidad, lowland depressional pondshore communities and communities under constant saturated conditions, such as waterfalls, rapids, and streams, in montane environments throughout the Caribbean islands.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ef. Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland (D262)

Elcode: M710

\*Scientific Name: *Cladium mariscus ssp. jamaicense - Eleocharis cellulosa - Panicum hemitomon* Marsh Macrogroup

\*Common (Translated Scientific) Name: Jamaica Swamp Sawgrass - Gulf Coast Spikerush - Maidencane Marsh Macrogroup

\*Colloquial Name: Caribbean Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept: The mosaic formed in south Florida by freshwater marshes and wet prairies communities is determined by the amount of precipitation, the length of the hydroperiod, fine topographic gradients, substrate, and fire regime. Tall or short-statured sawgrass marsh, dominated by *Cladium mariscus ssp. jamaicense* is the most extensive community in the Everglades due to its ability to survive fire, low nutrient conditions and occasional freezing. Deeper marshes may support an array of emergent plants that includes sparse *Cladium mariscus ssp. jamaicense, Panicum hemitomon, Rhynchospora tracyi*, or *Eleocharis cellulosa*. Florida's wet prairies in the Everglades (often referred to as "flats") are characterized by short emergent plants (mostly grasses), and are the transition zone between sawgrass areas and sloughs. Wet flats may be dominated by *Eleocharis cellulosa, Rhynchospora tracyi, Pontederia cordata*, or *Panicum hemitomon*. Wet marl prairie dominants may include one or more of the following: *Eragrostis elliottii, Muhlenbergia filipes, Rhynchospora divergens, Schizachyrium rhizomatum, Schoenus nigricans, Spartina bakeri*, and a short form of sawgrass. Wet prairies occur on higher and drier sites than marshes and sloughs, on both peat and marl soil; they dry out on an annual basis but require seasonal flooding with 6-10 months of standing water.

In the Greater Antilles, some characteristic freshwater marsh species include *Cladium mariscus ssp. jamaicense, Cyperus* spp., *Eleocharis interstincta, Isoetes* sp., *Paspalum floridanum, Saccharum giganteum, Thalia geniculata*, and *Typha domingensis*. These freshwater herbaceous wetlands are often associated with a body of freshwater such as a river, stream, lake, lagoon, or pond, or the wetland's freshwater supply also can come from precipitation or groundwater upwelling. These marshes can be flooded for long periods of time or they may be inundated infrequently. Depending on their location with respect to the coast, some freshwater marshes can experience the influence of tides. The *Copernicia* or *Sabal* waterlogged savannas included in this macrogroup are secondary savannas that result from the frequent logging of timber species and fuel woods of the wooded swamps, followed by burning and grazing, a process which converts them into a *Sabal* wet grassland.

\*Diagnostic Characteristics: Communities within this macrogroup are generally vegetated by a diverse group of herbaceous plants, including grasses, sedges, rushes, swamp ferns, broad-leaved aquatic plants, and soft-stemmed aquatic plants such as cattails, arrowheads, pickerelweed and reeds, growing in water or wet soils.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M066 | Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh |  |

Similar NVC Types General Comments [optional]: ~South Florida Freshwater Marsh & Wet Prairie Group (G129)$$, included in this macrogroup, has several characteristics shared with ~Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh Group (G110)$$ in ~Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh Macrogroup (M066)$$, especially for the dominance in both cases of *Cladium mariscus ssp. jamaicense*; however, some of the important accompanying grass species differ at the species level.

VEGETATION

Physiognomy and Structure Summary: In south Florida and much of the Caribbean, these are graminoid wetlands. The stature can vary from 20 cm to over 3 m tall.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: In south Florida, marsh communities include tall and short-statured *Cladium mariscus ssp. jamaicense, Sagittaria lancifolia*, and *Pontederia cordata*. Wet flats may be dominated by *Eleocharis cellulosa, Rhynchospora tracyi*, or *Panicum hemitomon*. In the absence of fire, portions of stands will become dominated by *Salix caroliniana*. Other aquatic and wetland plants that may be present include *Bacopa caroliniana, Ceratophyllum demersum, Chara* sp., *Najas guadalupensis, Nuphar advena, Nymphaea odorata, Pistia stratiotes, Sagittaria lancifolia, Thalia geniculata*, and *Utricularia inflata*. Ferns include *Acrostichum danaeifolium, Nephrolepis exaltata*, and *Blechnum serrulatum*. Grasses and graminoids may include *Schoenoplectus tabernaemontani, Typha domingensis*, and *Zizaniopsis miliacea*. Dominants of the wet marl flats may include *Eragrostis elliottii, Muhlenbergia filipes (= Muhlenbergia sericea), Rhynchospora divergens, Schizachyrium rhizomatum, Schoenus nigricans, Spartina bakeri*, and a short form of sawgrass. Marshes in depression ponds have some different plants; *Aristida palustris* is characteristic and possibly *Hypericum fasciculatum*, depending upon fire history. A large number of other wetland species may be present, such as *Eriocaulon compressum, Eriocaulon decangulare, Rhexia cubensis, Rhynchospora filifolia, Rhynchospora inundata, Xyris elliottii, Xyris fimbriata, Xyris jupicai*, and others. Patches of woody species, including *Annona glabra, Cephalanthus occidentalis, Morella cerifera (= Myrica cerifera)*, and *Salix caroliniana*, are often scattered in deeper pockets of peat (FNAI 2010a).

Detailed information across much of the Caribbean is lacking. Some characteristic freshwater marsh species include *Cladium mariscus ssp. jamaicense, Cyperus* spp., *Eleocharis interstincta, Isoetes* sp., *Montrichardia* sp., *Paspalum floridanum (= Paspalum giganteum), Phragmites* sp., *Saccharum giganteum (= Erianthus giganteus), Thalia geniculata*, and *Typha domingensis*. The *Copernicia* or *Sabal* waterlogged savannas included in this macrogroup are secondary savannas that result from the frequent logging of timber species and fuel woods of the wooded swamps, followed by burning and grazing, a process which converts them into a *Sabal* wet grassland.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The successional dynamics of the Everglades is controlled by the interaction of hydroperiod, fire frequency, degree of fire intensity, animal activity and drought. Alligator activity can also change the hydrology and nutrient status of sites and create ponds (Richardson 2000). Drought, absence of fire, or drainage allows the invasion of upland macrophytes, scrub and hardwood species, such as *Salix caroliniana* and eventually *Acer rubrum*. Across the Antilles the composition and dynamics of freshwater marshes is also controlled by hydroperiod, substrate, and drought seasonality; the influence of fire as part of the natural processes is not documented. The *Copernicia* or *Sabal* waterlogged savannas are the result of a "savannization" process of swamp forests that starts by logging of timber species and fuel woods turning the diverse swamps into a *Sabal* palm swamp, which by burning and grazing is converted into a *Sabal* wet grassland and eventually into a wet pasture with scattered *Sabal* palms (Borhidi 1988).

ENVIRONMENT

Environmental Description: *Climate:* Subtropical to tropical in the Antilles. Rainfall is higher in the summer than the winter. Given the wide geographic distribution of this macrogroup, mean annual precipitation and temperature vary greatly. In the Everglades over a 70-year period the median annual precipitation was 1336 mm with a low of 990 and a high of 1955 mm (Richardson 2000). The Caribbean islands also have a rainy season from May through October and a dry season during the winter of the Northern Hemisphere. Even during the rainy season, precipitation ranges vary depending on aspect (windward versus leeward sides of the islands), and on elevation, with contrasting annual rainfall amounts of over 3000 mm in mountainous areas and below 1000 mm in lowland leeward sides. Average daily temperatures are above 10<sup>o</sup>C, even in the winter, and from April through October the daily average is above 27<sup>o</sup>C. Hydroperiod ranges from 5-12 months; some marshes have a hydroperiod of 8-12 months. Seasonal droughts are also an important component of the dynamic processes.

*Soil/substrate*: The soils of the Everglades are primarily peats and mucks that have accumulated to a depth of 4 m in the north but are less than 20 cm deep in portions in the south. The other dominant soil type is a calcareous mud, formed by cyanobacteria that reprecipitate calcium carbonate, or marl, originally derived from the limestone substrate. This soil is highly alkaline and impermeable, sealing off the underlying limestone and causing water to pond during the wet season (Richardson 2000). In the Caribbean islands, several lowland wetlands have also developed on marine sediments of carbonated rocks with varying degrees of karstification and peat formation on top. Flooded palm savannas occur on poor sandy soils or lateritic soils with an impermeable layer close to the surface. As with the Florida freshwater wetlands, soils in the Caribbean wetlands are affected by the hydrogeological conditions, and the formation of peat is related to the duration and depth of flooding.

DISTRIBUTION

\*Geographic Range: This macrogroup is found in southern Florida and across the Caribbean region.

Nations: BS, CU, DM, DO, GD, GP, HT, JM, MQ, MS, PR, TT, US, VC, VG, VI, XA, XC, XD

States/Provinces: FL

USFS Ecoregions (2007) [optional]: 411A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G462 | Cuban Seasonally Flooded Copernicia - Sabal Secondary Savanna |
| G470 | Caribbean Freshwater Marsh |
| G471 | Caribbean Acidic Depression Graminoid Wet Meadow |
| G129 | South Florida Freshwater Marsh & Wet Prairie |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-17 | M041 Caribbean & Central American Freshwater Marsh Macrogroup | M041 split into M710 & M711 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Saw Grass Marshes | Craighead 1971 |  |
| < | Spike Rush Marshes | Craighead 1971 |  |
| = | The Everglades | Gunderson and Loftus 1993 |  |
| = | The Everglades (Southern Fen Peatland) | Richardson 2000 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 13 Apr 2015

REFERENCES

\*References [Required if used in text]:

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Craighead, F. C., Jr. 1971. The trees of south Florida. Volume I. The natural environments and their succession. University of Miami Press, Coral Gables. 212 pp.

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FNAI [Florida Natural Areas Inventory]. 2010a. Guide to the natural communities of Florida: 2010 edition. Florida Natural Areas Inventory, Tallahassee, FL. 228 pp. [https://fnai.org/naturalcommguide.cfm]

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Kushlan, J. A. 1990. Freshwater marshes. Pages 324-363 in: R. L. Myers and J. J. Ewel, editors. Ecosystems of Florida. University of Central Florida Press, Orlando.

Richardson, C. J. 2000. Freshwater wetlands. Pages 448-499 in: M. G. Barbour and W. D. Billings, editors. North American terrestrial vegetation. Second edition. Cambridge University Press, New York. 434 pp.

2. Shrub & Herb Vegetation

2.C.3.Ef. Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland

M711. Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence: Herbaceous and shrubland wetlands occurring in different hydrogeomorphologic situations in the floodplains of rivers of the Caribbean basin of Colombia and Venezuela. The climate is seasonal. Mean annual precipitation is over 2200 mm, falling during a 6-7 month wet season; the mean annual temperature is above 25°C. These wetlands occur in depressions that are permanently to semipermanently inundated, fed by stream overflow, seepage and ground waters. Characteristic species include *Anthurium semani, Maranta arundinacea*, and *Typha domingensis*, together with the associated trees/shrubs *Annona glabra, Callophylum maria, Erythrina fusca, Pterocarpus officinalis, Samanea saman*, and *Trema integerrima*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ef. Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland (D262)

Elcode: M711

\*Scientific Name: Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland Macrogroup

\*Colloquial Name: Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept: These herbaceous and shrubland wetlands occur in different hydrogeomorphologic situations in the floodplains of rivers of the Caribbean basin of Colombia and Venezuela. The climate is seasonal. Mean annual precipitation is over 2200 mm, falling during a 6-7 month wet season; the mean annual temperature is above 25°C. These wetlands occur in depressions that are permanently to semipermanently inundated, fed by stream overflow, seepage and ground waters. Characteristic species include *Anthurium semani, Maranta arundinacea*, and *Typha domingensis*, together with the associated trees/shrubs *Annona glabra, Callophylum maria, Erythrina fusca (= Erythrina glauca), Pterocarpus officinalis, Samanea saman*, and *Trema integerrima*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BZ, CO, CR, EC, GT, HN, NI, PA, SV

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-17 | M041 Caribbean & Central American Freshwater Marsh Macrogroup | M041 split into M710 & M711 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2016)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Eg. Colombian-Venezuelan Freshwater Marsh, Flooded Savanna & Shrubland

D263. Colombian-Venezuelan Freshwater Marsh, Flooded Savanna & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.3.Eg. Tropical Freshwater Marsh, Wet Meadow & Shrubland (F030)

Elcode: D263

\*Scientific Name: Colombian-Venezuelan Freshwater Marsh, Flooded Savanna & Shrubland Division

\*Common (Translated Scientific) Name: Colombian-Venezuelan Freshwater Marsh, Flooded Savanna & Shrubland Division

\*Colloquial Name: Colombian-Venezuelan Freshwater Marsh, Flooded Savanna & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M712 | Colombian-Venezuelan Freshwater Marsh, Wet Meadow & Shrubland |
| M715 | Llanos Flooded Savanna |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Eg. Colombian-Venezuelan Freshwater Marsh, Flooded Savanna & Shrubland

M715. Llanos Flooded Savanna

Type Concept Sentence: These are seasonally flooded savannas. The period of inundation can be almost permanent, depending on their location in the floodplains of streams and rivers across the Orinoquian Llanos of Colombia and Venezuela. They range from seasonally flooded palm savannas with *Copernicia tectorum* in relatively higher areas with clayish, poorly drained soils, to herbaceous savannas in lower and flat areas that remain almost permanently inundated or waterlogged.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Eg. Colombian-Venezuelan Freshwater Marsh, Flooded Savanna & Shrubland (D263)

Elcode: M715

\*Scientific Name: Llanos Flooded Savanna Macrogroup

\*Common (Translated Scientific) Name: Llanos Flooded Savanna Macrogroup

\*Colloquial Name: Llanos Flooded Savanna

\*Type Concept: This macrogroup represents savannas that get flooded seasonally for varying periods of time to almost permanently depending on their distribution along the gradient of topographic differences in the floodplains of streams and rivers across the Orinoquian Llanos of Colombia and Venezuela. From palm savannas with *Copernicia tectorum* in relatively higher areas but with clayish, ill-drained soils, flooded seasonally, to only herbaceous savanna in lower and flat areas of the floodplain with undefined drainage systems which remain almost permanently inundated or waterlogged. The seasonal flooding savannas are dominated by *Leersia hexandra, Mesosetum* sp., *Trachypogon spicatus (= Trachypogon montufari), Paspalum carinatum, Trachypogon plumosus, Paspalum stellatum, Sorghastrum setosum (= Sorghastrum parviflorum), Axonopus purpusii*, and besides the *Copernicia* palm, they include other species in the open shrub or tree layer. In the lower areas and with longer flooding, the diagnostic species are *Arundinella hispida (= Arundinella confinis), Pistia stratiotes, Paspalum fasciculatum, Paspalum fluitans (= Paspalum repens), Hymenachne amplexicaulis, Eragrostis japonica (= Eragrostis glomerata), Luziola spruceana, Eleocharis interstincta*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Eh. Guianan Freshwater Marsh, Wet Meadow & Shrubland

D264. Guianan Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.3.Eh. Tropical Freshwater Marsh, Wet Meadow & Shrubland (F030)

Elcode: D264

\*Scientific Name: Guianan Freshwater Marsh, Wet Meadow & Shrubland Division

\*Common (Translated Scientific) Name: Guianan Freshwater Marsh, Wet Meadow & Shrubland Division

\*Colloquial Name: Guianan Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO, GF, GY, SV, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M717 | Central Guianan Flooded Savanna |
| M718 | Western Guianan Flooded Savanna & Shrubland |
| M707 | Orinoquian Floodplain Peat Meadow & Marsh |
| M720 | Orinoquian Floodplain Marsh & Flooded Savanna |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Eh. Guianan Freshwater Marsh, Wet Meadow & Shrubland

M717. Central Guianan Flooded Savanna

Type Concept Sentence: Savannas that make up a riparian system occurring along alluvial valley bottoms in the Gran Sabana and other mid-elevation areas of the Guiana highlands of Venezuela and adjacent Brazil and Guyana between 600 and 1000 m elevation. Formed by a dense, tall grass cover up to 2 m high with large stands of the palm *Mauritia flexuosa*. Other species include *Andropogon* spp., *Byttneria genistella, Hypogynium virgatum, Mahurea exstipulata, Miconia stephananthera, Panicum* spp., *Piper sabanense, Piper tamayoanum, Rhynchospora* spp., and *Xyris* spp. Other forms of this savanna class are scattered in a few locations in the piedmont of the Guiana highlands.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Eh. Guianan Freshwater Marsh, Wet Meadow & Shrubland (D264)

Elcode: M717

\*Scientific Name: Central Guianan Flooded Savanna Macrogroup

\*Common (Translated Scientific) Name: Central Guianan Flooded Savanna Macrogroup

\*Colloquial Name: Central Guianan Flooded Savanna

\*Type Concept: The main type of savanna in this macrogroup is a sort of riparian system occurring along alluvial valley bottoms in the Gran Savanna and other mid-elevation areas of the Guiana highlands, between 600-1000 m altitude. It is formed by a dense tall grass cover up to 2 m high and large populations of the palm *Mauritia flexuosa*. Other species of this community include *Hypogynium virgatum, Andropogon* spp., *Panicum* spp., *Rhynchospora* spp., *Byttneria genistella, Xyris* spp., *Miconia stephananthera, Mahurea exstipulata, Piper sabanense*, and *Piper tamayoanum*. Other types of the macrogroup are much more restricted in distribution and are scattered in a few locations in the piedmont of the Guiana highlands. The distribution of the macrogroup is mainly Venezuela, but it extends to Brazil and Guyana.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, GY, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Eh. Guianan Freshwater Marsh, Wet Meadow & Shrubland

M718. Western Guianan Flooded Savanna & Shrubland

Type Concept Sentence: Seasonally flooded savannas of the southern side of the Orinoco River floodplain, close to the river's delta. These are savannas with an open shrub layer and a short and sparse grass layer. Diagnostic species are *Bulbostylis lanata, Comolia leptophylla, Echinolaena inflexa, Panicum micranthum, Panicum orinocanum, Panicum tricholaenoides, Rhynchospora filiformis, Rhynchospora globosa, Sorghastrum setosum, Utricularia* spp., and *Xyris* sp.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Eh. Guianan Freshwater Marsh, Wet Meadow & Shrubland (D264)

Elcode: M718

\*Scientific Name: Western Guianan Flooded Savanna & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Western Guianan Flooded Savanna & Shrubland Macrogroup

\*Colloquial Name: Western Guianan Flooded Savanna & Shrubland

\*Type Concept: This macrogroup represents seasonally flooded savannas of the southern side of the Orinoco River floodplain, close to its delta. These are savannas with an open shrub layer and a short and sparse grass layer. Diagnostic species are *Panicum orinocanum, Panicum micranthum, Bulbostylis lanata, Rhynchospora filiformis, Rhynchospora globosa, Xyris* sp., *Utricularia* spp., *Comolia leptophylla, Sorghastrum setosum, Panicum tricholaenoides*, and *Echinolaena inflexa*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Eh. Guianan Freshwater Marsh, Wet Meadow & Shrubland

M707. Orinoquian Floodplain Peat Meadow & Marsh

Type Concept Sentence: Wetlands associated with the Orinoco River floodplains and delta in conditions where peat accumulates in the soils. Inland it includes *Mauritia* palm swamps growing on less permeable, peat soils. These swamps are fed mostly by black water and remain waterlogged year round. They grow in mosaics with inundated savannas and herbaceous swamps. Typical species of these wetlands are *Calophyllum lucidum, Cecropia palmatisecta, Cuphea odonnelli, Desmocellis villosa, Hypogynium virgatum, Ludwigia lithospermifolia, Ludwigia nervosa, Mauritia flexuosa, Mayaca sellowiana, Philodendron acutatum, Rhynchospora tenuis, Xilopia aromatica*, and *Xyris caroliniana*. Includes marshy meadows of the lower Orinoco delta.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Eh. Guianan Freshwater Marsh, Wet Meadow & Shrubland (D264)

Elcode: M707

\*Scientific Name: Orinoquian Floodplain Peat Meadow & Marsh Macrogroup

\*Common (Translated Scientific) Name: Orinoquian Floodplain Peat Meadow & Marsh Macrogroup

\*Colloquial Name: Orinoquian Floodplain Peat Meadow & Marsh

\*Type Concept: This macrogroups represents the different wetlands associated with the Orinoco River floodplain and delta, in conditions that accumulate peat in the soils. Inland it includes the *Mauritia* palm swamps on saturated peat soils developed on a sandy horizon which in turn develops on less permeable soil. These palm swamps are related to the hydrologic regime of the river, feed mostly with blackwaters, and are almost permanently waterlogged. They grow in a mosaic with inundated savannas and herbaceous swamps. Species typical of these palm swamps are *Mauritia flexuosa, Ludwigia lithospermifolia, Ludwigia nervosa, Xilopia aromatica, Cecropia palmatisecta, Cuphea odonnelli, Desmocellis villosa, Mayaca sellowiana, Xyris caroliniana, Rhynchospora tenuis, Hypogynium virgatum, Calophyllum lucidum*, and *Philodendron acutatum*. The macrogroup also includes the marshy meadows of the lower Orinoco delta dominated by *Montrichardia arborescens, Thalia geniculata, Typha domingensis, Cyperus giganteus, Heliconia psittacorum, Costus arbicus, Renealmia alpinia, Eichhornia crassipes, Paspalum fasciculatum, Blechnum serrulatum, Acrostichum aureum*, and *Cyperus articulatus*. This system with a similar composition continues south along the coast of Guyana and Suriname, in brackish but mainly freshwater wetlands of the coastal plain.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, GF, GY, SR, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-09-10 | M719 Eastern Guianan Coastal Plain Freshwater Marsh & Shrubland Macrogroup | M719 covered by M707 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Eh. Guianan Freshwater Marsh, Wet Meadow & Shrubland

M720. Orinoquian Floodplain Marsh & Flooded Savanna

Type Concept Sentence: Mosaic of open and palm tree-dominated flooded savannas of the Orinoco delta in Venezuela. Species that make up the open grasslands include *Mesosetum* spp., *Panicum caricoides, Paspalum plicatulum, Rhynchospora* spp., *Sorghastrum setosum*, and *Trachypogon plumosus*. Palm tree savanna is characterized by the grasses *Leersia hexandra* and *Imperata brasiliensis* and the palm *Mauritia flexuosa*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Eh. Guianan Freshwater Marsh, Wet Meadow & Shrubland (D264)

Elcode: M720

\*Scientific Name: Orinoquian Floodplain Marsh & Flooded Savanna Macrogroup

\*Common (Translated Scientific) Name: Orinoquian Floodplain Marsh & Flooded Savanna Macrogroup

\*Colloquial Name: Orinoquian Floodplain Marsh & Flooded Savanna

\*Type Concept: This macrogroup is composed of a mosaic of open and palm tree-dominated flooded savannas of the Orinoco delta in Venezuela. Species that make up the open grasslands include *Mesosetum* spp., *Panicum caricoides, Paspalum plicatulum, Rhynchospora* spp., *Sorghastrum setosum*, and *Trachypogon plumosus*. Palm tree savanna is characterized by the grasses *Leersia hexandra* and *Imperata brasiliensis* and the palm *Mauritia flexuosa*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2016)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ei. Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland

D265. Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.3.Ei. Tropical Freshwater Marsh, Wet Meadow & Shrubland (F030)

Elcode: D265

\*Scientific Name: Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland Division

\*Common (Translated Scientific) Name: Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland Division

\*Colloquial Name: Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M863 | Tropical Andean Pondshore & Wet Meadow |
| M722 | Andean Puna Wet Meadow |
| M721 | Northern Andean Wet Meadow |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ei. Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland

M863. Tropical Andean Pondshore & Wet Meadow

Type Concept Sentence: Marshes along the shores of lakes and streams characterized by emergent narrow- and broad-leaved herbs and grasses as well as floating-leaved herbs. Distributed across the Tropical Andes from Venezuela to Bolivia above 3000 m elevation. They are permanently saturated or subject to frequent flooding. There is a zonation characteristic of these communities across the gradient of inundation and stream exposure. Characteristic genera are *Deyeuxia, Eleocharis, Isoetes, Juncus, Lilaeopsis, Limosella, Mimulus, Myriophyllum, Puccinellia, Ranunculus, Schoenoplectus, Scirpus*, and *Typha*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ei. Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland (D265)

Elcode: M863

\*Scientific Name: Tropical Andean Pondshore & Wet Meadow Macrogroup

\*Common (Translated Scientific) Name: Tropical Andean Pondshore & Wet Meadow Macrogroup

\*Colloquial Name: Tropical Andean Pondshore & Wet Meadow

\*Type Concept: Emergent marshes along the shores of lakes and streams characterized by emergent narrow- and broad-leaved herbs and grass-like plants as well as floating-leaved herbs. They are distributed across the tropical Andes in Venezuela, Colombia, Ecuador, Peru and Bolivia, above 3000 m elevation and are permanently saturated or subject to frequent flooding. There is a zonation characteristic of these communities across the gradient of inundation and current exposure. Characteristic species are *Juncus effusa, Juncus microcephalus, Juncus arcticus, Ranunculus nubigenus, Eleocharis palustris, Eleocharis macrostachya, Eleocharis acicularis, Lysipomia sphagnophila, Juncus ecuadoriensis, Cotula mexicana, Scirpus giganteus, Limosella aquatica, Limosella australis (= Limosella subulata), Myriophyllum quitense, Ranunculus limoselloides, Ranunculus trichophyllus, Lilaea scilloides, Lilaeopsis macloviana, Mimulus glabratus, Crassula peduncularis, Isoetes glacialis, Isoetes karstenii, Isoetes palmeri, Lilaeopsis schaffneriana, Ranunculus spaniophyllus, Tillaea paludosa, Najas guadalupensis, Egeria canadensis, Callitriche nubigena, Ranunculus flagelliformis, Myriophyllum aquaticum (= Myriophyllum brasiliense), Hydrocotyle ranunculoides, Typha* spp., *Schoenoplectus californicus ssp. tatora, Ranunculus cymbalaria, Mimulus glabratus, Deyeuxia* spp., *Triglochin concinna*, and *Puccinellia frigida*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
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|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ei. Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland

M722. Andean Puna Wet Meadow

Type Concept Sentence: Dense tussock grasslands up to 0.6 m high that grow on temporarily waterlogged soils in topographic depressions and margins of lakes and streams in the high Andes of Peru, Bolivia and Argentina. Diagnostic species are *Aciachne acicularis, Calamagrostis chrysantha, Calamagrostis humboldtiana, Calamagrostis ovata, Calamagrostis rigescens, Carex* spp., *Chaptalia cordata, Cortaderia bifida, Cortaderia hapalotricha, Cyperus* spp., *Eleocharis* spp., *Festuca humilior, Festuca steinbachi, Gentianella* spp., *Halenia* sp., *Juncus* spp., *Oritrophium peruvianum, Perezia pungens*, and *Senecio comosus*. This type also occurs to a limited extent in the "dry Puna" of Bolivia and Argentina where there is a more seasonal climate and less annual precipitation.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ei. Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland (D265)

Elcode: M722

\*Scientific Name: Andean Puna Wet Meadow Macrogroup

\*Common (Translated Scientific) Name: Andean Puna Wet Meadow Macrogroup

\*Colloquial Name: Andean Puna Wet Meadow

\*Type Concept: Dense tussock grasslands that can reach up to 0.6 m high, growing on hydromorphic soils that get temporarily waterlogged, in topographic depressions and margins of lakes and streams, in the high-Andes of Peru, Bolivia and Argentina. Diagnostic species are *Calamagrostis chrysantha, Calamagrostis humboldtiana, Calamagrostis ovata, Calamagrostis rigescens, Festuca steinbachi, Festuca humilior, Aciachne acicularis, Senecio comosus, Perezia pungens, Cortaderia bifida, Cortaderia hapalotricha, Eleocharis* spp., *Carex* spp., *Cyperus* spp., *Juncus* spp., *Oritrophium peruvianum, Chaptalia cordata, Gentianella* spp., and *Halenia* sp. This type also occurs in the "dry Puna" of Bolivia and Argentina, subject to a more seasonal climate and much less annual precipitation, so the occurrences are of smaller extent and the composition tends to be less diverse, including *Eleocharis atacamensis, Carex nebularum, Hypochoeris taraxacoides, Lachemilla pinnata, Plantago tubulosa, Scirpus atacamensis*, and *Juncus depauperatus*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ei. Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland

M721. Northern Andean Wet Meadow

Type Concept Sentence: Grasslands growing in topographic depressions and valley bottoms of the northern Andes in Venezuela, Colombia and Ecuador. Water input is mainly from seepage in conditions that do not form peat in the substrate. Typical species are *Calamagrostis* spp., *Carex bonplandi, Juncus* spp., *Lachemilla pectinata, Loricaria colombiana, Loricaria thuyoides, Oritrophium peruvianum, Pentacalia vaccinioides, Scirpus* spp., and *Valeriana microphylla*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ei. Tropical Andean Freshwater Marsh, Wet Meadow & Shrubland (D265)

Elcode: M721

\*Scientific Name: Northern Andean Wet Meadow Macrogroup

\*Common (Translated Scientific) Name: Northern Andean Wet Meadow Macrogroup

\*Colloquial Name: Northern Andean Wet Meadow

\*Type Concept: Grasslands growing in topographic depressions and valley bottoms of the Northern Andes in Venezuela, Colombia and Ecuador, with water input originated mainly from seepage under conditions which do not form peat in the substrate. Typical species are *Lachemilla pectinata, Loricaria colombiana, Loricaria thuyoides, Oritrophium peruvianum, Pentacalia vaccinioides, Carex bonplandi, Valeriana microphylla, Juncus* spp., *Scirpus* spp., and *Calamagrostis* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ej. Amazonian Freshwater Marsh, Wet Meadow & Shrubland

D266. Amazonian Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.3.Ej. Tropical Freshwater Marsh, Wet Meadow & Shrubland (F030)

Elcode: D266

\*Scientific Name: Amazonian Freshwater Marsh, Wet Meadow & Shrubland Division

\*Common (Translated Scientific) Name: Amazonian Freshwater Marsh, Wet Meadow & Shrubland Division

\*Colloquial Name: Amazonian Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, CO, EC, GY, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M709 | Amazon Delta Peat Marsh |
| M724 | Amazonian-Guianan White Sand Flooded Savanna & Shrubland |
| M726 | Lower Amazon Wet Meadow & Shrubland |
| M725 | Upper Amazon Wet Meadow & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ej. Amazonian Freshwater Marsh, Wet Meadow & Shrubland

M709. Amazon Delta Peat Marsh

Type Concept Sentence: Marsh communities located in the coastal plain north of the mouth of the Amazon River and on Marajó Island in Brazil with stagnant water in shallow ponds or depressions that partially dry during the dry season. These marshes have tall, broad-leaved herbs accompanied by many floating or rooted aquatic plants, and often occur in the ecotone with *Mauritia* palm swamps. Soils have high content of organic matter and there is formation of peat. Common species and genera are *Cyperus giganteus, Diplasia karataefolia, Thalia geniculata, Cabomba, Eichhornia, Eleocharis, Nymphaea, Sagittaria*, and *Salvinia*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ej. Amazonian Freshwater Marsh, Wet Meadow & Shrubland (D266)

Elcode: M709

\*Scientific Name: Amazon Delta Peat Marsh Macrogroup

\*Common (Translated Scientific) Name: Amazon Delta Peat Marsh Macrogoup

\*Colloquial Name: Amazon Delta Peat Marsh

\*Type Concept: This macrogroup represents communities located in the coastal plains north of the mouth of the Amazon River and in the Marajó Island in Brazil. They are environments with stagnant water in shallow ponds or depressions which are partially dried during the dry season. The predominant appearance is marshes of tall, broad-leaved herbs accompanied by many floating or rooted aquatic plants. *Mauritia* palm forms water fringe communities, in transition to palm swamps. Soils have high content of organic matter and there is formation of peat. Common species and genera are *Cyperus giganteus, Thalia geniculata, Diplasia karataefolia, Salvinia, Eichhornia, Sagittaria, Cabomba, Nymphaea*, and *Eleocharis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ej. Amazonian Freshwater Marsh, Wet Meadow & Shrubland

M724. Amazonian-Guianan White Sand Flooded Savanna & Shrubland

Type Concept Sentence: Savannas occurring in the ecotone between the Amazon rainforest and Guiana Shield foothills. In Colombia, Brazil and Venezuela, these savannas occur as mosaics of grasslands and open shrublands or short-statured woodlands growing in the upper basins of blackwater tributaries to the Amazon and Orinoco rivers. They occur on deep quartzitic white sand, oligotrophic, and acidic soils. These savannas are often arranged in systems of mounts and swales where higher ground is covered by woody vegetation and herbaceous vegetation grows in inundated depressions.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ej. Amazonian Freshwater Marsh, Wet Meadow & Shrubland (D266)

Elcode: M724

\*Scientific Name: Amazonian-Guianan White Sand Flooded Savanna & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Amazonian-Guianan White Sand Flooded Savanna & Shrubland Macrogroup

\*Colloquial Name: Amazonian-Guianan White Sand Flooded Savanna & Shrubland

\*Type Concept: This macrogroup includes a few different types of savannas scattered in the ecotone area between the Amazon rainforest and the Guiana Shield piedmont. In the western area of this ecotone, in Colombia, Brazil and Venezuela, it is represented by mosaics of grassland and open shrubland or short-statured woodland, in the upper basins of blackwater tributaries of the Amazon and Orinoco rivers, with deep quartzitic white sand, oligotrophic and acidic soils. The different types of vegetation organize in a system of mounts and swales with the woody vegetation occupying the higher topographies and inundated herbaceous vegetation in the depressions. Characteristic species are *Heteropterys oblongifolia, Emmotum glabrum, Ormosia macrophylla, Calliandra tsugoides, Pagamea guianensis, Tepuianthus savannensis, Schoenocephalium cucullatum, Schoenocephalium teretifolium, Schoenocephalium martianum, Guacamaya superba, Xyris* spp., *Rhynchospora* spp., and *Paepalanthus* sp. Towards the east of its distribution, the macrogroup includes the flooding savannas of the Rupununi Rio Branco complex, characterized by lateritic poor soils, seasonally inundated and poorly drained. These are open savannas without woody vegetation, with species such as *Fimbristylis ferruginea* and *Rhynchospora barbata*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, CO, GY, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ej. Amazonian Freshwater Marsh, Wet Meadow & Shrubland

M726. Lower Amazon Wet Meadow & Shrubland

Type Concept Sentence: Herbaceous communities occurring along the extensive floodplains of the whitewater rivers of the lower Amazon Basin and its delta. These can be flooded from six months/year to almost permanently. In seasonally drained areas, the herbaceous vegetation communities include *Alchornea castaneifolia, Echinochloa polystachya, Echinochloa spectabilis, Eragrostis* spp., *Hymenachne amplexicaulis, Leersia hexandra, Montrichardia arborescens, Oriza* spp., *Paspalum fasciculatum, Paspalum fluitans, Salix humboldtiana*, and *Symmeria paniculata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ej. Amazonian Freshwater Marsh, Wet Meadow & Shrubland (D266)

Elcode: M726

\*Scientific Name: Lower Amazon Wet Meadow & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Lower Amazon Wet Meadow & Shrubland Macrogroup

\*Colloquial Name: Lower Amazon Wet Meadow & Shrubland

\*Type Concept: Herbaceous communities along the extensive floodplains of the whitewater rivers of the lower Amazon Basin and its delta. These can be almost permanently inundated and the slightly higher ones, during 6-9 months. In seasonally drained areas the herbaceous vegetation communities include *Paspalum fasciculatum, Paspalum fluitans (= Paspalum repens), Echinochloa polystachya, Echinochloa spectabilis, Hymenachne amplexicaulis, Leersia hexandra, Oriza* spp., *Eragrostis* spp., *Symmeria paniculata, Salix humboldtiana, Alchornea castaneifolia*, and *Montrichardia arborescens*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ej. Amazonian Freshwater Marsh, Wet Meadow & Shrubland

M725. Upper Amazon Wet Meadow & Shrubland

Type Concept Sentence: Flooded herbaceous communities occurring throughout the upper Amazon Basin, including wet meadows of oxbow lakes left by meandering rivers (with vegetation characterized by large-leaved forbs, palms and a few tree species), large floating mats formed by grasses and sedges in large rivers, and low-statured forest and herbaceous vegetation mosaics in the mounds and depressions of the floodplains surrounding the Bolivian Beni savannas.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ej. Amazonian Freshwater Marsh, Wet Meadow & Shrubland (D266)

Elcode: M725

\*Scientific Name: Upper Amazon Wet Meadow & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Upper Amazon Wet Meadow & Shrubland Macrogroup

\*Colloquial Name: Upper Amazon Wet Meadow & Shrubland

\*Type Concept: The macrogroup includes flooding herbaceous communities occurring in different situations in the upper Amazon Basin. More widespread but smaller in extent are the wet meadows of oxbow lakes left by meandering rivers, with vegetation characterized by large-leaved forbs, palms and a few tree species, also large floating mats formed by grasses and sedges in large rivers. Included as well are the short forest and herbaceous vegetation mosaic in the mounts and depressions of the periodically inundated landscape of the flat floodplains surrounding the Bolivian Beni savannas in the southwestern Amazon Basin of Bolivia and Peru. Some of the diagnostic species of this type are *Bellucia grossularioides, Cardiopetalum calophyllum, Coussarea hydrangeifolia, Erythroxylum daphnites, Miconia* spp., *Qualea grandiflora, Simarouba amara, Xylopia aromatica, Curatella americana, Siparuna guianensis, Byrsonima chrysophylla, Andropogon* spp., *Fimbristylis dichotoma, Mesosetum penicillatum, Paspalum virgatum, Trachypogon plumosus, Thrasya petrosa, Sorghastrum setosum, Arundinella hispida*, and *Sacciolepis myuros*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ek. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland

D267. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.3.Ek. Tropical Freshwater Marsh, Wet Meadow & Shrubland (F030)

Elcode: D267

\*Scientific Name: Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland Division

\*Common (Translated Scientific) Name: Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland Division

\*Colloquial Name: Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
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Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR?, BO, BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M731 | Caatinga Riparian Wet Meadow & Shrubland |
| M729 | Pantanal Floodplain Wet Meadow & Shrubland |
| M730 | Parana Floodplain Wet Meadow & Shrubland |
| M727 | Cerrado Flooded Savanna |
| M728 | Beni Flooded Savanna |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ek. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland

M729. Pantanal Floodplain Wet Meadow & Shrubland

Type Concept Sentence: Seasonally flooded meadows and shrublands in the Brazilian Pantanal. One type is characterized by seasonally flooded grass savanna surrounding shrublands growing on circular mounds. The woody vegetation on the mounds includes *Alibertia edulis, Allagoptera leucocalyx, Byrsonima chrysophylla, Byrsonima coccolobifolia, Copaifera martii, Dipteryx alata, Erythroxylum suberosum, Eugenia aurata, Maprounea guianensis, Pseudobombax longiflorum, Siparuna guianensis, Tabebuia serratifolia, Tapirira guianensis*, and *Vismia minutiflora*. In the transitional area between the Pantanal and the humid Chaco, savannas typically have a layer of the palm *Copernicia alba*. Also included are waterlogged meadows surrounding lagoons of the Pantanal, characterized by *Cyperus giganteus, Eleocharis elegans, Rhabdadenia pohlii*, and *Thalia geniculata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ek. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland (D267)

Elcode: M729

\*Scientific Name: Pantanal Floodplain Wet Meadow & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Pantanal Floodplain Wet Meadow & Shrubland Macrogroup

\*Colloquial Name: Pantanal Floodplain Wet Meadow & Shrubland

\*Type Concept: This macrogroup includes the shrubland and grassland communities flooded seasonally in the Brazilian Pantanal. One of the types is characterized by a combination of seasonally flooded open savanna surrounding shrublands growing on circular mounds, which can have a diameter of 1 or more and a height of 0.1-2 m. The woody vegetation on the mounds includes *Alibertia edulis, Andira cuyabensis, Allagoptera leucocalyx, Byrsonima chrysophylla, Byrsonima coccolobifolia, Copaifera martii, Didymopanax distractiflorus, Dipteryx alata, Siparuna guianensis, Tapirira guianensis, Virola sebifera, Vismia minutiflora, Tabebuia aurea, Tabebuia serratifolia, Eugenia aurata, Erythroxylum suberosum, Pseudobombax longiflorum, Maprounea guianensis*, among others. On the floodplains of the Paraguay River in the transitional area between the Pantanal and the humid Chaco, savannas typically have a layer of the palm *Copernicia alba*. Also part of this macrogroup are semipermanently flooded or waterlogged meadows and open shrublands surrounding lagoons and depressions of the Pantanal. These are formed by *Cyperus giganteus, Eleocharis elegans, Rhabdadenia pohlii, Thalia geniculata, Polygonum acuminatum, Hymenachne amplexicaulis, Eleocharis acutangula, Fuirena robusta, Fuirena umbellata*, and *Eichhornia azurea*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
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Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ek. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland

M730. Parana Floodplain Wet Meadow & Shrubland

Type Concept Sentence: Short to medium-tall grass meadows on poorly drained soils and subject to periodical overflow of small streams and seepage water from adjacent slopes in northeastern Argentina and southern Paraguay. They are dominated by *Eryngium floribundum, Ludwigia nervosa, Paspalum plicatum, Rhynchospora globosa, Setaria paucifolia*, and *Xyris jupicai*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ek. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland (D267)

Elcode: M730

\*Scientific Name: Parana Floodplain Wet Meadow & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Parana Floodplain Wet Meadow & Shrubland Macrogroup

\*Colloquial Name: Parana Floodplain Wet Meadow & Shrubland

\*Type Concept: Short to medium-tall grass meadows of poorly drained soils of northeastern Argentina and southern Paraguay, subject to periodic overflow of small streams and to seepage water from adjacent slopes. They are dominated by *Eryngium floribundum, Ludwigia nervosa, Paspalum plicatum, Rhynchospora globosa, Setaria paucifolia*, and *Xyris jupicai*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR?, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ek. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland

M727. Cerrado Flooded Savanna

Type Concept Sentence: Flooded savannas of the Cerrado in Brazil that are distributed on middle slopes or on the sides of valley where there is a seasonal alternation of water accumulation and dry periods. These savannas also occur along some large rivers with seasonal flooding, although this situation is more common of the adjacent Pantanal region. The vegetation is a low, open grassland savanna with large populations of the palm *Mauritia flexuosa*. Grass species include *Axonopus purpusii, Leersia hexandra, Paspalum hydrophilum, Reimarochloa acuta*, and species of *Andropogon, Aristida, Bulbostylis, Paepalanthus, Paspalum, Rhynchospora, Syngonanthus*, and *Trachypogon*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ek. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland (D267)

Elcode: M727

\*Scientific Name: Cerrado Flooded Savanna Macrogroup

\*Common (Translated Scientific) Name: Cerrado Flooded Savanna Macrogroup

\*Colloquial Name: Cerrado Flooded Savanna

\*Type Concept: The flooded savannas of the Cerrado in Brazil are mainly distributed in midslopes or valley sides where there is seasonal seepage water accumulation alternating with dry periods. They also occur along some large rivers with seasonal flooding, though this situation is more common of the adjacent Pantanal region. The vegetation is a low open grassland savanna with large populations of the palm *Mauritia flexuosa*. Grass species include *Axonopus purpusii, Leersia hexandra, Paspalum hydrophilum, Reimarochloa acuta*, and species of *Andropogon, Aristida, Bulbostylis, Paepalanthus, Paspalum, Rhynchospora, Syngonanthus*, and *Trachypogon*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M351 Cerrado Shrubland & Savanna Macrogroup | M351 reconfigured into M684, M685, M686, M688, M727 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.Ek. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland

M728. Beni Flooded Savanna

Type Concept Sentence: Several types of flooded savanna of the Beni floodplain in Bolivia. Differences in structure and composition are related to the length of the flooding period, the nature of the flooding waters, as well as the soils or substrate where they grow. In turn, these conditions depend on the topographic and geographic location within the floodplain. Typical grasses are *Cyperus giganteus, Leersia hexandra, Luziola peruviana, Oryza latifolia*, and several species of *Paspalum* and *Polygonum*. A woody stratum can occur that includes *Alchornea schomburgkii, Erythrina fusca, Genipa americana, Inga pallida, Machaerium aristulatum*, and *Swartzia jorori*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.Ek. Parana-Brazilian Freshwater Marsh, Wet Meadow & Shrubland (D267)

Elcode: M728

\*Scientific Name: Beni Flooded Savanna Macrogroup

\*Common (Translated Scientific) Name: Beni Flooded Savanna Macrogroup

\*Colloquial Name: Beni Flooded Savanna

\*Type Concept: This macrogroup represents the several types of flooded savanna of the vast Beni floodplain in Bolivia. The differences in structure and composition of the communities are related with the length of the flooding period, the nature of the flooding waters, as well as the soils or substrate where they grow. In turn, these conditions depend on the topographic and geographic location within the floodplain. Some of the diagnostic species are *Paspalum atratum, Paspalum densum, Paspalum acuminatum, Luziola peruviana, Leersia hexandra, Cyperus giganteus, Panicum elephantipes, Oryza latifolia, Hymenachne amplexicaulis, Hymenachne donacifolia, Echinodorus* spp., *Echinochloa polystachya, Polygonum acuminatum, Polygonum hispidum*, and *Polygonum punctatum*. Communities that also have a woody component may include *Erythrina fusca, Machaerium aristulatum, Swartzia jorori, Genipa americana, Alchornea schomburgkii, Buchenavia oxycarpa, Albizia inundata, Crataeva tapia, Eschweilera ovalifolia, Inga pallida, Inga punctata*, and *Peritassa dulcis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.El. Chaco Freshwater Marsh, Flooded Savanna & Shrubland

D268. Chaco Freshwater Marsh, Flooded Savanna & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.3.El. Tropical Freshwater Marsh, Wet Meadow & Shrubland (F030)

Elcode: D268

\*Scientific Name: Chaco Freshwater Marsh, Flooded Savanna & Shrubland Division

\*Common (Translated Scientific) Name: Chaco Freshwater Marsh, Flooded Savanna & Shrubland Division

\*Colloquial Name: Chaco Freshwater Marsh, Flooded Savanna & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M734 | Eastern Chaco Marsh & Flooded Savanna |
| M732 | Chaco Riparian Marsh & Shrubland |
| M733 | Southern Chaco Riparian Marsh & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
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\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.El. Chaco Freshwater Marsh, Flooded Savanna & Shrubland

M734. Eastern Chaco Marsh & Flooded Savanna

Type Concept Sentence: Grass savannas and other types of herbaceous meadows of the floodplain of the Pilcomayo River in the eastern Chaco region in Paraguay and northern Argentina. The vegetation communities include those closer to the river, which flood up to 1.5-2 m for several months and those with a less extreme flooding regime. The former have no woody or shrub layer and are dominated by *Aeschynomene montevidensis, Byttneria scabra, Caperonia cordata, Conyza bonariensis, Cuphea racemosa, Cyperus reflexus, Leersia hexandra, Oryza subulata, Panicum laxum, Panicum prionitis, Paspalum intermedium, Poa pilcomayensis, Rhynchospora corymbosa*, and *Sorghastrum agrostoides*. Communities growing where there is a shorter flooding period include dense populations of the palm *Copernicia alba*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.El. Chaco Freshwater Marsh, Flooded Savanna & Shrubland (D268)

Elcode: M734

\*Scientific Name: Eastern Chaco Marsh & Flooded Savanna Macrogroup

\*Common (Translated Scientific) Name: Eastern Chaco Marsh & Flooded Savanna Macrogroup

\*Colloquial Name: Eastern Chaco Marsh & Flooded Savanna

\*Type Concept: Grass savannas and other types of herbaceous meadows of the floodplain of the Pilcomayo River in the eastern Chaco region in Paraguay and northern Argentina. The vegetation communities include those closer to the river which get inundated up to 1.5-2 m for several months and those with a lower flooding regime. The former have no woody or shrub layer and are dominated by *Sorghastrum agrostoides, Panicum prionitis, Oryza subulata, Leersia hexandra, Cuphea racemosa, Aeschynomene montevidensis, Caperonia cordata, Byttneria scabra, Cyperus reflexus, Rhynchospora corymbosa, Panicum laxum, Poa pilcomayensis, Conyza bonariensis*, and *Paspalum intermedium*. The communities which experience a shorter flooding period include dense palm populations of *Copernicia alba*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.3.El. Chaco Freshwater Marsh, Flooded Savanna & Shrubland

M732. Chaco Riparian Marsh & Shrubland

Type Concept Sentence: Riparian open shrubland to herbaceous marshes of the northern Chaco with an active flooding dynamic and seral vegetation communities organized according to the level and periodicity of flooding. Woody components include *Acacia aroma, Acacia caven, Acacia macracantha, Mimosa pellita, Salix humboldtiana, Sapium haematospermum, Sesbania virgata, Tessaria dodoneaefolia*, and *Tessaria integrifolia*. Open woodlands of *Bulnesia sarmientoi, Cercidium praecox, Dyckia ferox*, and *Stetsonia coryne* can occur on poorly drained, fine-textured soils of recent streambeds that are occasionally flooded.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.3.El. Chaco Freshwater Marsh, Flooded Savanna & Shrubland (D268)

Elcode: M732

\*Scientific Name: Chaco Riparian Marsh & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Chaco Riparian Marsh & Shrubland Macrogroup

\*Colloquial Name: Chaco Riparian Marsh & Shrubland

\*Type Concept: Riparian open shrubland to herbaceous marshes of the northern Chaco, with an active flooding dynamic and seral vegetation communities organized according to the level and periodicity of flooding. Woody components include *Salix humboldtiana, Tessaria integrifolia, Tessaria dodoneaefolia, Acacia aroma, Acacia macracantha, Acacia caven, Sapium haematospermum, Sesbania virgata, Mimosa pellita (= Mimosa pigra)*, to open woodlands of *Bulnesia sarmientoi, Dyckia ferox, Cercidium praecox*, and *Stetsonia coryne* growing on poorly drained, fine-textured soils of recent streambeds that are occasionally flooded.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M352 Northern Chaco Shrubland & Savanna Macrogroup | M352 reconfigured into M732, M780, M781 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2.C.4. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland

Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland includes wet riparian and swamp shrublands, wet meadows, wet prairies, and shallow and deep emergent marshes. The vegetation comprises seasonal green emergent, hydrophytic shrubs and herbs with at least 10% cover, on mucky, inundated or saturated soils across the mid-latitudes of the Northern and Southern hemispheres from 23° to 70°.

2. Shrub & Herb Vegetation

2.C.4.Ee. South American Temperate Freshwater Marsh, Wet Meadow & Shrubland

D284. South American Temperate Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.4.Ee. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland (F013)

Elcode: D284

\*Scientific Name: South American Temperate Freshwater Marsh, Wet Meadow & Shrubland Division

\*Common (Translated Scientific) Name: South American Temperate Freshwater Marsh, Wet Meadow & Shrubland Division

\*Colloquial Name: South American Temperate Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M760 | Pampean Freshwater Marsh, Wet Meadow & Shrubland |
| M864 | Southern Andean Montane Freshwater Marsh & Wet Meadow |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.4.Ee. South American Temperate Freshwater Marsh, Wet Meadow & Shrubland

M760. Pampean Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence: Grasslands of the floodplains of the Argentinian and Uruguayan Pampas that remain waterlogged for several months per year due to river overflow or precipitation. Formed by tall grasses 1.5-3 m high growing on clayish or sandy-clayish soils. Diagnostic species are *Andropogon lateralis ssp. lateralis, Cortaderia selloana, Hymenachne grumosa, Paspalum durifolium, Paspalum quadrifarium*, and *Saccharum* spp. Also includes the marshes of the lower Parana River floodplain. The palustrine communities exhibit zonation, characterized by *Ludwigia peploides, Polygonum* spp., *Schoenoplectus californicus, Schoenoplectus californicus, Typha* spp., and *Zizaniopsis bonariensis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Ee. South American Temperate Freshwater Marsh, Wet Meadow & Shrubland (D284)

Elcode: M760

\*Scientific Name: Pampean Freshwater Marsh, Wet Meadow & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Pampean Freshwater Marsh, Wet Meadow & Shrubland Macrogroup

\*Colloquial Name: Pampean Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept: The macrogroup represents grasslands of the Argentinian and Uruguayan Pampas, and the floodplains of the Argentinian Mesopotamia region, located in the topographical depressions or areas subject to river overflow and/or poorly drained precipitation that remain waterlogged for several months. Generally formed by tall grasses 1.5-3 m high growing on clayish or sandy-clayish soils. Diagnostic species are *Cortaderia selloana, Hymenachne grumosa, Andropogon lateralis ssp. lateralis, Paspalum durifolium, Paspalum quadrifarium, Paspalum* spp., and *Saccharum* spp. The macrogroup also includes the marshes of the lower Parana River floodplain which remain permanently waterlogged. Related to the length and depth of the flooding period, there is a zonation of the palustrine communities, characterized by different species of *Polygonum* and *Typha*, in addition to *Schoenoplectus californicus, Zizaniopsis bonariensis, Schoenoplectus californicus*, and *Ludwigia peploides*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

D031. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence: This division contains marshes, wet meadows and shrublands, singly and in mosaics, along riparian corridors, around vernal pools, depressions, seeps and springs on mineral soils or shallow organic layers over mineral substrates in temperate (and possibly southern boreal) latitudes of western North America.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.4.Nb. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland (F013)

Elcode: D031

\*Scientific Name: *Alnus viridis ssp. sinuata - Salix boothii / Carex* spp. Western North American Freshwater Marsh, Wet Meadow & Shrubland Division

\*Common (Translated Scientific) Name: Sitka Alder - Booth's Willow / Sedge species Western North American Freshwater Marsh, Wet Meadow & Shrubland Division

\*Colloquial Name: Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept: This is a broad division that covers freshwater marshes, wet meadows and shrub-dominated wetlands found at all elevations up to, but excluding, alpine areas throughout the Pacific coast, from the Aleutian Islands of Alaska to southern Oregon, and throughout the temperate (and possibly southern boreal) interior of western U.S. and Canada.

Species composition is highly varied across this division. In the **coastal Pacific Northwest shrublands** dominant canopy species include *Alnus viridis ssp. sinuata*, various species of *Salix* (such as *Salix commutata* and *Salix sitchensis*), *Spiraea douglasii, Malus fusca, Cornus sericea, Alnus incana ssp. tenuifolia, Alnus viridis ssp. crispa*, and *Myrica gale*. The **interior regions riparian shrublands** include *Alnus incana, Betula occidentalis, Acer glabrum, Artemisia cana, Artemisia tridentata ssp. tridentata, Cornus sericea, Crataegus douglasii, Crataegus rivularis, Dasiphora fruticosa ssp. floribunda, Forestiera pubescens, Oplopanax horridus, Philadelphus lewisii, Prunus virginiana, Rhus trilobata, Rosa nutkana, Rosa woodsii*, many *Salix* species, *Shepherdia argentea*, and *Symphoricarpos* spp.

**Freshwater herbaceous marshes along the coast** tend to be dominated by species that include *Deschampsia beringensis, Festuca rubra, Argentina egedii, Lathyrus japonicus var. maritimus, Heracleum maximum, Parnassia palustris, Lupinus nootkatensis, Angelica lucida, Carex mackenziei, Leymus mollis, Carex lyngbyei*, and *Carex obnupta*. **Maritime Alaska freshwater marshes** are described as having *Carex rostrata, Equisetum fluviatile, Carex aquatilis var. dives, Menyanthes trifoliata, Comarum palustre, Eleocharis palustris*, and *Schoenoplectus tabernaemontani*. **Freshwater mudflats** can be dominated by *Eleocharis obtusa, Lilaeopsis occidentalis, Crassula aquatica, Limosella aquatica, Gnaphalium palustre, Eragrostis hypnoides*, and *Ludwigia palustris*. **Non-coastal freshwater marshes** are dominated by mostly graminoids (*Carex, Scirpus* and/or *Schoenoplectus, Eleocharis, Juncus, Typha latifolia*) but also some forbs such as *Sparganium, Sagittaria, Bidens, Cicuta, Rorippa*, and *Mimulus*.

Vernal pool species composition is highly specific and often contains many endemic species. Characteristic plant species in northern California and the southern Cascades vernal pool herbaceous communities include *Blennosperma nanum, Callitriche marginata, Cicendia quadrangularis, Cressa truxillensis, Downingia bella, Downingia insignis, Epilobium densiflorum, Eryngium aristulatum, Eryngium mathiasiae, Eryngium vaseyi, Lasthenia ferrisiae, Lasthenia glaberrima, Plagiobothrys leptocladus, Pogogyne douglasii, Psilocarphus brevissimus, Sedella pumila, Spergularia salina*, and many others. Less than a third of the California vernal pool species overlap with vernal pools found further north and are not listed here.

High-elevation wet meadows in the Rocky Mountains, Pacific Northwest and Intermountain regions are often dominated by *Carex illota, Carex lachenalii, Carex nigricans, Carex vernacula, Deschampsia cespitosa, Juncus drummondii*, and forbs *Caltha leptosepala, Trollius laxus, Phippsia algida, Rorippa alpina, Sibbaldia procumbens*, and *Trifolium parryi*. **Lower-elevation wet meadows** include *Calamagrostis canadensis, Calamagrostis stricta, Carex aquatilis, Carex bolanderi, Carex exsiccata, Carex illota, Carex microptera, Carex scopulorum, Carex utriculata, Eleocharis quinqueflora, Glyceria striata, Juncus drummondii, Juncus nevadensis*, and *Scirpus* and/or *Schoenoplectus* spp. Forb species include *Camassia quamash, Cardamine cordifolia, Dodecatheon jeffreyi, Phippsia algida, Rorippa alpina, Senecio triangularis, Trifolium parryi*, and *Veratrum californicum*. Due to intensive historical sheep and cattle grazing and other land uses, wet meadows throughout the West can become dominated by non-native species such as *Agrostis gigantea, Agrostis stolonifera, Conyza canadensis, Phalaris arundinacea, Phragmites australis, Poa palustris*, and *Poa pratensis*.

Stands occur on poorly-drained or well-drained seasonally wet to saturated soils that may dry out completely during the growing season, and are located in depressions, around lakes or ponds, or river terraces and floodplains where water tables fluctuate seasonally. Some depressions are poorly-drained with fine-textured organic, muck or mineral soils with standing water common throughout the growing season. Others are semipermanently to seasonally flooded during the growing season, or have only subsurface saturation. Substrates range from sand dunes to hardpan caliche layers, bedrock or shallow organic over mineral soils, loose unconsolidated highly stratified alluvial material. Water sources may be groundwater, riverflows, direct rainwater or snowmelt runoff. The physical setting for these wetlands is highly variable and includes interdunal areas, delta deposits, uplifted marshes, beach deposits; mudflats of seasonally flooded shallow lakebeds and floodplains; streambanks of permanent, intermittent and ephemeral streams; active channel low-gradient gravel bars; steep avalanche chutes; and stagnant oxbow lakes, levees, and sloughs. The freshwater emergent marshes and wet meadows can be found on mineral soils at low and high elevations. Bogs and fens on true organic soils (>40 cm depth) are in their own division, ~North American Bog & Fen Division (D029)$$.

\*Diagnostic Characteristics: Shrublands and wet herbaceous communities on saturated to well-drained but seasonally wet soils, that can be fine-grained muck or mineral overlain by shallow organic soils (<40 cm), but are for the most part mineral soil wetlands. A diagnostic list of species is needed for this division.

\*Classification Comments: This division does not include bogs and fens which are defined by deep (>40 cm) organic soils. The degree to which this type extends into the boreal is not clear; its relation to 2.C.4.Np ~Circumpolar Arctic & Subarctic Freshwater Marsh & Wet Meadow Division (D320)$$ needs to be resolved.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D027 | Pacific North American Coastal Scrub & Herb Vegetation |  |
| D029 | North American Bog & Fen | are true organic-soil shrub and herb wetlands. |
| D032 | Southwestern North American Warm Desert Freshwater Marsh & Bosque | occurs further south in warmer climes. |
| D323 | Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland |  |
| D322 | Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland |  |
| D320 | Arctic Freshwater Marsh & Wet Meadow | is primarily arctic, but its extent into the boreal is not clear. |
| D035 | Temperate & Boreal Pacific Coastal Salt Marsh |  |
| D040 | Western North American Cool Semi-Desert Scrub & Grassland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Species composition is highly varied across this division. In the **coastal Pacific Northwest shrublands** dominant canopy species include *Alnus viridis ssp. sinuata*, various species of *Salix* (such as *Salix commutata* and *Salix sitchensis*), *Spiraea douglasii, Malus fusca, Cornus sericea, Alnus incana ssp. tenuifolia (= Alnus tenuifolia), Alnus viridis ssp. crispa (= Alnus crispa)*, and *Myrica gale*. The **interior regions riparian shrublands** include *Alnus incana, Betula occidentalis, Acer glabrum, Artemisia cana, Artemisia tridentata ssp. tridentata, Cornus sericea, Crataegus douglasii, Crataegus rivularis, Dasiphora fruticosa ssp. floribunda, Forestiera pubescens, Oplopanax horridus, Philadelphus lewisii, Prunus virginiana, Rhus trilobata, Rosa nutkana, Rosa woodsii*, many *Salix* species, *Shepherdia argentea*, and *Symphoricarpos* spp.

**Freshwater herbaceous marshes along the coast** tend to be dominated by species that include *Deschampsia beringensis, Festuca rubra, Argentina egedii (= Potentilla egedii), Lathyrus japonicus var. maritimus, Heracleum maximum, Parnassia palustris, Lupinus nootkatensis, Angelica lucida, Carex mackenziei, Leymus mollis, Carex lyngbyei*, and *Carex obnupta*. **Maritime Alaska freshwater marshes** are described as having *Carex rostrata, Equisetum fluviatile, Carex aquatilis var. dives (= Carex sitchensis), Menyanthes trifoliata, Comarum palustre, Eleocharis palustris*, and *Schoenoplectus tabernaemontani*. **Freshwater mudflats** can be dominated by *Eleocharis obtusa, Lilaeopsis occidentalis, Crassula aquatica, Limosella aquatica, Gnaphalium palustre, Eragrostis hypnoides*, and *Ludwigia palustris*. **Non-coastal freshwater marshes** are dominated by mostly graminoids (*Carex, Scirpus* and/or *Schoenoplectus, Eleocharis, Juncus, Typha latifolia*) but also some forbs such as *Sparganium, Sagittaria, Bidens, Cicuta, Rorippa*, and *Mimulus*.

Vernal pool species composition is highly specific and often contains many endemic species. Characteristic plant species in northern California and the southern Cascades vernal pool herbaceous communities include *Blennosperma nanum, Callitriche marginata, Cicendia quadrangularis, Cressa truxillensis, Downingia bella, Downingia insignis, Epilobium densiflorum (= Boisduvalia densiflora), Eryngium aristulatum, Eryngium mathiasiae, Eryngium vaseyi, Lasthenia ferrisiae, Lasthenia glaberrima, Plagiobothrys leptocladus (= Allocarya leptoclada), Pogogyne douglasii, Psilocarphus brevissimus, Sedella pumila (= Parvisedum pumilum), Spergularia salina (= Spergularia marina)*, and many others. Less than a third of the California vernal pool species overlap with vernal pools found further north and are not listed here.

High-elevation wet meadows in the Rocky Mountains, Pacific Northwest and Intermountain regions are often dominated by *Carex illota, Carex lachenalii, Carex nigricans, Carex vernacula, Deschampsia cespitosa, Juncus drummondii*, and forbs *Caltha leptosepala, Trollius laxus, Phippsia algida, Rorippa alpina, Sibbaldia procumbens*, and *Trifolium parryi*. **Lower-elevation wet meadows** include *Calamagrostis canadensis, Calamagrostis stricta, Carex aquatilis, Carex bolanderi, Carex exsiccata, Carex illota, Carex microptera, Carex scopulorum, Carex utriculata, Eleocharis quinqueflora, Glyceria striata (= Glyceria elata), Juncus drummondii, Juncus nevadensis*, and *Scirpus* and/or *Schoenoplectus* spp. Forb species include *Camassia quamash, Cardamine cordifolia, Dodecatheon jeffreyi, Phippsia algida, Rorippa alpina, Senecio triangularis, Trifolium parryi*, and *Veratrum californicum*.

Due to intensive historical sheep and cattle grazing and other land uses, wet meadows throughout the West can become dominated by non-native species such as *Agrostis gigantea, Agrostis stolonifera, Conyza canadensis, Phalaris arundinacea, Phragmites australis, Poa palustris*, and *Poa pratensis*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: *Soils/substrate:* Stands occur on poorly-drained or well-drained seasonally wet to saturated soils that may dry out completely during the growing season, and are located in depressions, around lakes or ponds, or river terraces and floodplains where water tables fluctuate seasonally. The vegetation can occur as relatively simple stands of wet shrublands, marshes and wet meadows, or in extensive mosaics of all three kinds. Some depressions are poorly-drained with fine-textured organic, muck or mineral soils with standing water common throughout the growing season. Others are semipermanently to seasonally flooded during the growing season, or have only subsurface saturation. Substrates range from sand dunes to hardpan caliche layers, bedrock or shallow organic over mineral soils, loose unconsolidated highly stratified alluvial material. Water sources may be groundwater, riverflows, direct rainwater or snowmelt runoff. The physical setting for these wetlands is highly variable and includes interdunal areas, delta deposits, uplifted marshes, beach deposits; mudflats of seasonally flooded shallow lakebeds and floodplains; streambanks of permanent, intermittent and ephemeral streams; active channel low-gradient gravel bars; steep avalanche chutes; and stagnant oxbow lakes, levees, and sloughs. The freshwater emergent marshes and wet meadows can be found on mineral soils at low and high elevations.

DISTRIBUTION

\*Geographic Range: This type occurs throughout temperate and possibly southern boreal regions of western North America, from the Aleutian Islands to Baja California east into the Great Basin and Rocky Mountains and possibly as far north as the southern boreal regions of northwestern Canada and Alaska.

Nations: CA, MX, US

States/Provinces: AB, AK, AZ, BC, CA, CO, ID, MB, MT, MXBC, NM, NT, NU, NV, OR, SD, SK, TX, UT, WA, WY, YT

USFS Ecoregions (2007) [optional]: 242:C, 261:C, 262:C, 263:P, 313:C, 315:C, 321:C, 322:C, 331:C, 341:C, 342:C, M242:C, M261:C, M313:C, M331:C, M332:C, M333:C, M334:P, M341:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M888 | Arid West Interior Freshwater Marsh |
| M074 | Western North American Vernal Pool |
| M073 | Vancouverian Lowland Marsh, Wet Meadow & Shrubland |
| M893 | Western North American Montane Marsh, Wet Meadow & Shrubland |
| M894 | North American Boreal Marsh, Wet Meadow & Shrubland |
| M301 | Western North American Ruderal Marsh, Wet Meadow & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2012-07-17 | D045 Arctic Wet Tundra Division | split & merged |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: W.J. Mitsch and J.G. Gosselink (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 04 Jan 2016

REFERENCES

\*References [Required if used in text]:

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2. Shrub & Herb Vegetation

2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

M888. Arid West Interior Freshwater Marsh

Type Concept Sentence: These arid west freshwater marshes are found at all elevations below alpine throughout the interior basins and mountains of western North America, with dominant species such *Carex pellita, Carex praegracilis, Eleocharis palustris, Juncus arcticus ssp. littoralis, Paspalum distichum, Schoenoplectus americanus, Schoenoplectus pungens, Typha domingensis, Typha latifolia*, and species of *Bidens, Cicuta, Cyperus, Mimulus*, and *Phalaris*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (D031)

Elcode: M888

\*Scientific Name: Arid West Interior Freshwater Marsh Macrogroup

\*Common (Translated Scientific) Name: Arid West Interior Freshwater Marsh Macrogroup

\*Colloquial Name: Arid West Interior Freshwater Marsh

\*Type Concept: These arid west freshwater marshes are found at all elevations below timberline throughout the interior basins and mountains of western North America. Vegetation is characterized by a lush, dense herbaceous layer with low diversity, sometimes occurring as a monoculture. Structure varies from emergent forbs which barely reach the water surface to tall graminoids that reach as tall as 4 m high. Dominant species include *Carex pellita, Carex praegracilis, Eleocharis palustris, Juncus arcticus ssp. littoralis, Paspalum distichum, Schoenoplectus americanus, Schoenoplectus pungens, Typha domingensis, Typha latifolia*, and species of *Bidens, Cicuta, Cyperus, Mimulus*, and *Phalaris*. This macrogroup includes shallow freshwater to brackish waterbodies found in bottomlands along drainages, in river floodplain depressions, cienegas, oxbow lakes, below seeps, frequently flooded gravel bars, low-lying sidebars, in-fill side channels, small ponds, stockponds, ditches and slow-moving streams, perennial streams in valleys and mountain foothills, as well as in small depressions gouged into basalt by Pleistocene floods, channeled scablands of the Columbia Plateau and within dune fields in the intermountain western U.S. These wetlands are mostly small-patch, confined to limited areas in suitable floodplain or basin topography. They are mostly semipermanently flooded, but some marshes have seasonal hydrologic flooding. Water is on or above the surface for most of the growing season. A consistent source of freshwater is essential to the function of these communities. Soils are muck or mineral or muck over a mineral soil, and water is high-nutrient. It is often found along the borders of ponds, lakes or reservoirs that have more open water. Some occurrences are interdunal wetlands in wind deflation areas, where sands are scoured down to the water table. The water table may be perched over an impermeable layer of caliche or clay or, in the case of the Great Sand Dunes of Colorado, a geologic dike that creates a closed basin that traps water.

\*Diagnostic Characteristics: Temperate continental, permanently saturated to seasonally flooded wetlands, often with standing water for much of the year, dominated by emergent graminoid herbaceous vegetation. Characteristic dominant species include *Typha* spp., *Schoenoplectus* spp., *Eleocharis palustris, Carex praegracilis, Carex pellita*, and *Cyperus* spp.

\*Classification Comments: This macrogroup does not include oceanic saline-influenced tidal areas (coastal saline marshes and brackish marshes) which belong to ~Temperate Pacific Salt Marsh Group (G499)$$. Marshes in saline waters located at the edge of the Great Salt Lake are included in ~North American Desert Alkaline-Saline Marsh & Playa Group (G538)$$.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M301 | Western North American Ruderal Marsh, Wet Meadow & Shrubland |  |
| M082 | Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland |  |
| M109 | Western North American Freshwater Aquatic Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Vegetation is characterized by a lush, dense to open emergent herbaceous layer. . The emergent vegetation is characterized by graminoids, annual or perennial forbs or a mixture of all three. Heights varies from low forbs that barely breaking the water surface to tall graminoids up to 4 m high. Sites are permanently or seasonally inundated which prevents the establishment of woody species. Ponds typically have concentric rings or zones of vegetation.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: These arid west interior marshes are dominated by emergent herbaceous species, mostly graminoids (*Carex, Eleocharis, Juncus, Scirpus* and/or *Schoenoplectus, Typha*,) but also some forbs. Stands vary in diversity, with some stands occurring as a monoculture of one of the dominant genera. Dominant species include *Carex pellita (= Carex lanuginosa), Carex praegracilis, Cyperus* spp., *Distichlis spicata, Eleocharis palustris, Flaveria chlorifolia, Helianthus paradoxus, Juncus arcticus ssp. littoralis (= Juncus balticus), Paspalum distichum, Ranunculus aquatilis, Schoenoplectus americanus, Schoenoplectus pungens, Typha domingensis, Typha latifolia*, and species of *Bidens, Cicuta, Mimulus*, and *Phalaris*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Sites are depressions, ponds, springs, and riparian areas that are heavily inundated for at least part of the growing season which impedes the establishment of woody species. Isolated marshes in dune systems are subject to changes in size and location of the wet swales as the sand dunes shift, due to active dune migration. Dune "blowouts" and subsequent stabilization through succession are characteristic processes of the active dunes which surround the interdunal swales.

ENVIRONMENT

Environmental Description: *Climate:* Temperate Continental climate. Environmental settings include bottomlands along drainages, in river floodplain depressions, cienegas, oxbow lakes, below seeps, frequently flooded gravel bars, low-lying sidebars, infilled side channels, small ponds, stockponds, ditches and slow-moving streams, perennial streams in valleys and mountain foothills. Elevations range from 890 to 1560 m (2930-5120 feet). *Soil/substrate/hydrology:* Substrates are variable but are generally fine-textured, alkaline, alluvial soil, coarse loam, sandy loam, sand, silt or peat. Hydrologic regimes vary from seasonal inundation followed by complete soil desiccation to year-round standing water. Water may be poorly oxygenated and nitrogen-rich. They are mostly semipermanently flooded, but some marshes have seasonal hydrologic flooding. Water is at or above the surface for most of the growing season. A consistent source of freshwater is essential to the function of these systems. Soils are muck or mineral or muck over a mineral soil, and water is high-nutrient. Environmental information compiled from Bowers (1982, 1984, 1986), Banner et al. (1986, 1993), Lloyd et al. (1990), MacKinnon et al. (1990), Cooper and Severn (1992), Viereck et al. (1992), Shiflet (1994), Holland and Keil (1995), Shephard (1995), Steen and Coupe (1997), Hammond (1998), Pineada et al. (1999), Boggs (2000), Rondeau (2001), Brand and Sanderson (2002), and Chappell and Christy (2004).

DISTRIBUTION

\*Geographic Range: This macrogroup is found throughout the temperate western North America interior (Columbia Basin, Great Basin, Colorado Plateau, and higher intermountain basins of western North America). It is also known to occur in dune fields across the intermountain western U.S., including the Great Sand Dunes in southern Colorado and the Pink Coral Dunes in Utah, and may also occur in dune fields in northeastern Arizona and the Great Basin, as well as in southwestern Wyoming in the Killpecker Dunes and Ferris Dunes, and southern Idaho.

Nations: CA, MX, US

States/Provinces: AZ, CA, CO, ID, NM, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G531 | Arid West Interior Freshwater Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | III.A.3.d - Fresh sedge marsh | Viereck et al. 1992 |  |
| > | III.B.3.a - Fresh herb marsh | Viereck et al. 1992 |  |
| > | Wetlands (217) | Shiflet 1994 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M. Reid, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel, J. Christy, D. Faber-Langendoen

Acknowledgments [optional]:

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2. Shrub & Herb Vegetation

2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

M074. Western North American Vernal Pool

Type Concept Sentence: This macrogroup includes herbaceous communities with high diversity and high endemism that form distinct zones or concentric rings within shallow ephemeral pools on hardpan soils with an indurated clay or cemented layer or on shallow soils over unfractured bedrock. It is found throughout intermountain valleys of British Columbia, Oregon, Washington, California and Mexico

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (D031)

Elcode: M074

\*Scientific Name: *Callitriche marginata - Downingia elegans - Eryngium aristulatum* Western North American Vernal Pool Macrogroup

\*Common (Translated Scientific) Name: Winged Water-starwort - Elegant Calicoflower - California Eryngo Western North American Vernal Pool Macrogroup

\*Colloquial Name: Western North American Vernal Pool

\*Type Concept: This macrogroup includes herbaceous communities that form distinct zones or concentric rings around shallow ephemeral pools from sea level to 2600 m (7800 feet) elevation. The number of species is high and changes from north to south, so there are no particularly characteristic species, although there are characteristic plant genera that can be described at the macrogroup level. These include species of *Callitriche, Downingia, Eryngium, Hemizonia, Lasthenia, Navarretia, Orcuttia, Plagiobothrys, Pogogyne, Psilocarphus, Sedella, Spergularia*, and *Trichostema*. Pools occur on shallow soils over volcanic bedrock, in scablands, on hardpan soils with an indurated clay or cemented layer that retains water throughout some portion of the spring, and that typically dry down completely into early summer months. These occur in British Columbia, Oregon, Washington, California and Mexico.

\*Diagnostic Characteristics: Herbaceous, forb-dominated communities found within depressional wetlands that are seasonally wet and dry, forming concentric rings or zones within pools of shallow open water or within ponds of low emergent vegetation that often contain many endemic and rare plant and invertebrate species.

\*Classification Comments: How are alkaline vernal pools different from playas or alkaline depressions? For example, why don't halophytes occur in the alkaline vernal pools? Some specific discussion addressing that potential confusion would be worthwhile. The discussion under the Dynamics section hints at this.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M073 | Vancouverian Lowland Marsh, Wet Meadow & Shrubland | contains wet meadows and marshes that are generally dominated by graminoid species and do not form communities of concentric rings around small, ephemeral shallow pools. |
| M301 | Western North American Ruderal Marsh, Wet Meadow & Shrubland | includes wet meadows and marshes dominated by non-native herbaceous species. These may have replaced the native vegetation surrounding vernal pools to the point that the native herbaceous community is no longer recognizable. |
| M076 | Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland | contains wet meadows and marshes in warm desert climates that are generally dominated by graminoid species and do not form communities of concentric rings around small, ephemeral shallow pools. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Annual and perennial herbaceous species that are mostly forbs, with low stature, generally <1 m in height.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Many endemic plant species are found in vernal pools. Characteristic species are predominantly annual and diverse. Northern scabland vernal pools share about a third of the species found in northern California vernal pools, but they do not share many of the more common dominant species. Vernal pool communities tend to be forb-dominated with many rare and endemic plant species (Barbour et al. 2007a, b, Fristrom and Game 2011) and animals (Belk 1998, Fugate 1998), many of which are documented to occur only in vernal pools.

In British Columbia, Washington and Oregon, pools have characteristic species that include *Callitriche marginata, Callitriche* spp., *Camissonia tanacetifolia, Deschampsia danthonioides, Downingia elegans, Elatine* spp., *Eleocharis* spp., *Epilobium densiflorum (= Boisduvalia densiflora), Eryngium petiolatum, Eryngium vaseyi, Grindelia nana, Isoetes orcuttii, Juncus uncialis, Myosurus minimus (= Myosurus x clavicaulis), Navarretia leucocephala ssp. diffusa, Pilularia americana, Plagiobothrys* spp., *Plagiobothrys figuratus, Plagiobothrys scouleri, Polyctenium williamsiae, Polygonum polygaloides ssp. confertiflorum, Polygonum polygaloides ssp. polygaloides, Psilocarphus brevissimus, Psilocarphus elatior, Psilocarphus oregonus, Trifolium cyathiferum, Triteleia hyacinthina*, and *Veronica peregrina* (Bjork 1997, Chappell and Christy 2004).

In northern Nevada, most of the species by biomass are perennials and include *Juncus arcticus ssp. littoralis (= Juncus balticus), Carex douglasii, Muhlenbergia richardsonis*, and species of *Eleocharis, Polygonum, Rumex*, and *Polyctenium* (J. Morefield pers. comm. 2010).

Characteristic plant species in northern California and the southern Cascades include *Artemisia cana ssp. bolanderi, Blennosperma nanum, Callitriche marginata, Cicendia quadrangularis, Cressa truxillensis, Downingia bella, Downingia insignis, Epilobium densiflorum (= Boisduvalia densiflora), Eryngium aristulatum, Eryngium mathiasiae, Eryngium vaseyi, Lasthenia ferrisiae, Lasthenia glaberrima, Mimulus* ssp., *Plagiobothrys leptocladus (= Allocarya leptoclada), Pogogyne douglasii, Pogogyne* spp., *Psilocarphus brevissimus, Sedella pumila (= Parvisedum pumilum), Spergularia salina (= Spergularia marina)*, and *Veronica peregrina* (Barbour et al. 2007a, b, Sawyer et al. 2009).

In the Great Valley of central California where short inundation periods are characteristic, *Alopecurus saccatus, Callitriche marginata, Crassula aquatica, Deschampsia danthonioides, Downingia bicornuta, Elatine californica, Eleocharis acicularis, Eryngium vaseyi, Isoetes orcuttii, Juncus bufonius, Lasthenia californica, Navarretia leucocephala, Pilularia americana, Plagiobothrys stipitatus, Pogogyne ziziphoroides, Psilocarphus brevissimus*, and *Veronica peregrina ssp. xalapensis* are often present and diagnostic. Where longer inundation periods are characteristic, *Lasthenia glaberrima* and *Eleocharis macrostachya* may be found (Barbour et al. 2005, 2007a, b, Sawyer et al. 2009).

In southern California, characteristic plant species include *Eryngium aristulatum, Centromadia parryi ssp. australis (= Hemizonia parryi ssp. australis), Lasthenia glabrata ssp. coulteri, Navarretia fossalis, Orcuttia californica, Pogogyne abramsii, Pogogyne nudiuscula*, and *Trichostema austromontanum* (Barbour et al. 2007, Sawyer et al. 2009). Given their relative isolation in upland-dominated landscapes, many endemic plant species are common in vernal pools (Witham et al. 1998, Barbour et al. 2007a, b).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Depressions are seasonally filled by winter and spring rain, followed by nine months of no rain such that they dry with a slowly decreasing pond depth. This inundation and slow drying period is an important aspect that differentiates vernal pools from other types of wetlands, and is one reason for the highly unique flora and fauna found there. Some pools fill annually, others only once in several years. Some years pools dry up quickly, in other years they may remain inundated for 2 years.

ENVIRONMENT

Environmental Description: Vernal pools of this macrogroup are found in areas with a Mediterranean climate of mild winters and dry summers. The ground often has a hummocky micro-relief over bedrock or soil underlain by a clay pan or hardpan which restricts water drainage. Drainage is prevented by a cemented layer of indurated clay or cemented Si or Fe, or unfractured bedrock. These wetlands tend to be acidic to circumneutral to alkaline and slightly saline. Depressions tend to be relatively small closed basins that fill annually during winter and spring through rainfall and/or snowmelt. Some pools remain dry for several years, while in wetter regions, pools can remain inundated for two years in a row.

DISTRIBUTION

\*Geographic Range: This macrogroup is found throughout intermountain valleys of British Columbia, Oregon, Washington, California and Mexico, from sea level to 2600 m (7800 feet) elevation. It is found on the Gulf and San Juan islands of Washington; in the northern Columbia Basin and perhaps the Okanagan Valley in British Columbia; the western portion of the Great Basin in Nevada; in the Lassen, Klamath, and upper Pit river drainages, and the Devils Garden area, the northern Central Valley, in the foothills of the southern Cascades and Sierra Nevada of northern California; and in southern California where they range from Baja Norte, Mexico, north through Santa Barbara County, California (Bjork 1997, Chappell and Christy 2004, Barbour et al. 2007a).

Nations: CA, MX, US

States/Provinces: BC, CA, MXBC, NV, OR, WA

USFS Ecoregions (2007) [optional]: 261B:CC, 262A:CC, 342B:PP, M242C:??, M261C:C?, M261D:CP, M261E:CP, M261F:C?, M261G:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]: Some floristic overlap between groups may warrant combining some groups together.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G530 | Californian Vernal Pool |
| G529 | Oregon-Washington-British Columbia Vernal Pool |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | California Vernal Pool | Barbour and Billings 2000 | Describes California variation of vernal pools. Does not cover Oregon and Washington vernal pools. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C.W. Witham et al. (1998)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

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Acknowledgments [optional]:

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2. Shrub & Herb Vegetation

2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

M073. Vancouverian Lowland Marsh, Wet Meadow & Shrubland

Type Concept Sentence: This macrogroup includes freshwater shrublands, meadows, marshes and mudflat wetlands, with mostly mineral soils that are that are poorly to well-drained and seasonally wet to saturated, occurring at low elevations from the Pacific coast and inland to interior wetlands of shallow lakebeds, rivershores of the Columbia River and the Rocky Mountains.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (D031)

Elcode: M073

\*Scientific Name: Vancouverian Lowland Marsh, Wet Meadow & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Vancouverian Lowland Marsh, Wet Meadow & Shrubland Macrogroup

\*Colloquial Name: Vancouverian Lowland Marsh, Wet Meadow & Shrubland

\*Type Concept: This macrogroup includes freshwater shrublands, meadows, marshes and mudflat wetlands. Stands include riparian shrublands, herbaceous meadows, emergent marshes and sparse mudflats dominated by low forbs. Dominant shrubs include *Acer glabrum, Alnus incana ssp. tenuifolia, Alnus viridis ssp. crispa, Alnus viridis ssp. sinuata, Artemisia cana, Cornus sericea, Crataegus douglasii, Crataegus rivularis, Dasiphora fruticosa ssp. floribunda, Malus fusca, Philadelphus lewisii, Prunus virginiana, Rhus trilobata, Rosa nutkana, Rosa woodsii, Rubus spectabilis*, many *Salix* spp., *Shepherdia argentea, Spiraea douglasii*, and *Symphoricarpos* spp. Herbaceous species are quite varied and include graminoids *Calamagrostis canadensis, Carex aquatilis var. dives, Carex flava, Carex lyngbyei, Carex mackenziei, Carex obnupta, Carex pellita, Carex praegracilis, Carex utriculata, Cyperus* spp., *Deschampsia beringensis, Deschampsia cespitosa, Eleocharis obtusa, Eleocharis palustris, Elymus trachycaulus, Eragrostis hypnoides, Glyceria striata, Juncus arcticus ssp. littoralis, Juncus lesueurii, Juncus nevadensis, Leymus cinereus, Leymus mollis, Muhlenbergia filiformis, Muhlenbergia richardsonis, Pascopyrum smithii, Paspalum distichum, Phalaris* spp., *Poa cusickii, Poa secunda, Schoenoplectus americanus, Schoenoplectus pungens, Typha domingensis*, and *Typha latifolia*; forbs *Achillea millefolium var. borealis, Angelica lucida, Argentina anserina, Argentina egedii, Bidens* spp., *Castilleja* spp., *Cicuta* spp., *Crassula aquatica, Euthamia occidentalis, Galium triflorum, Gnaphalium palustre, Heracleum maximum, Hydrocotyle umbellata, Iris missouriensis, Lathyrus japonicus var. maritimus, Lilaeopsis occidentalis, Limosella aquatica, Ludwigia palustris, Lupinus nootkatensis, Lysichiton americanus, Maianthemum stellatum, Mimulus* spp., *Parnassia palustris*, and *Rorippa curvisiliqua*; ferns and fern allies *Athyrium filix-femina, Equisetum arvense, Equisetum fluviatile, Equisetum variegatum*, and *Gymnocarpium dryopteris*; and mosses *Sphagnum* spp. These species are associated with wetlands that occur on poorly drained or well-drained seasonally wet to saturated soils that may dry out completely during the growing season, and are mostly on mineral or shallow (<30 cm) organic or muck soils over mineral substrates. This type ranges from southern Alaska to northern New Mexico, and includes only freshwater, non-saline wetlands that occur in lowland elevations, from sea level to about 1830 m (6000 feet) (generally below the transition from montane forests to lowland grasslands and shrublands).

\*Diagnostic Characteristics: This macrogroup includes a broad range of species associated with freshwater shrublands, meadows, marshes and mudflat wetlands. Stands include riparian shrublands, herbaceous meadows, emergent marshes and sparse mudflats dominated by low forbs. See the floristics section for details.

\*Classification Comments: Is the floristic variability here greater than it is for peatlands or forested wetlands? For peatlands the macrogroups are more finely divided among floristic regions (North Pacific, Vancouverian) and the forested are split biogeographically at the division level! However, here all western shrublands, wet meadows and marshes are only split out at the group level. Are there data justifying that the floristics of this macrogroup (M073) are much more homogenous than those of other wetland types? If they show as much variability as those other groups, then some consistency is needed in how the macrogroups are defined: Vancouverian, Rocky Mountain, Intermountain Basin. Or, to keep logic consistency, those other macrogroup should be lumped (i.e., M063 and M064 = Western North American Bog & Fen (J. Rocchio pers. comm. 2014). Should swamp versus riparian be more consistently applied within the groups of this macrogroup? Great Plains wetland. Possible split: (1) Within 2.B.6 Nb, split M073 into two macrogroups for Vancouverian/Temperate Pacific (G322+G517+G525) and Western North American Interior (G526+G531) bioregions. (2) Consider a physiognomic-based macrogroup within M073--although might that make more sense at division scale?

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M050 | Southern Vancouverian Lowland Grassland & Shrubland |  |
| M172 | Northern Vancouverian Lowland-Montane Grassland & Shrubland |  |
| M301 | Western North American Ruderal Marsh, Wet Meadow & Shrubland |  |
| M074 | Western North American Vernal Pool |  |
| M076 | Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland |  |
| M071 | Great Plains Marsh, Wet Meadow, Shrubland & Playa | extends west to the Rocky Mountain foothills. |
| M109 | Western North American Freshwater Aquatic Vegetation |  |

Similar NVC Types General Comments [optional]: Communities dominated by *Eleocharis palustris* can occur in ~Western North American Vernal Pool Macrogroup (M074)$$ but usually have vernal pool associate species as well, though not always.

VEGETATION

Physiognomy and Structure Summary: Deciduous broadleaf shrublands, short to tall (0.5-5 m) and low-statured herbaceous wetlands dominated by perennial graminoids, annual plants or emergent vegetation.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Dominant shrubs include *Acer glabrum, Alnus incana ssp. tenuifolia, Alnus viridis ssp. sinuata, Artemisia cana, Cornus sericea, Crataegus douglasii, Crataegus rivularis, Dasiphora fruticosa ssp. floribunda, Malus fusca, Philadelphus lewisii, Prunus virginiana, Rhus trilobata, Rosa nutkana*, many *Salix* spp., *Shepherdia argentea, Spiraea douglasii*, and *Symphoricarpos* spp. Herbaceous species are quite varied and include graminoids *Calamagrostis canadensis, Carex aquatilis var. dives (= Carex sitchensis), Carex flava (= Carex nevadensis), Carex lyngbyei, Carex mackenziei, Carex obnupta, Carex pellita (= Carex lanuginosa), Carex praegracilis, Carex utriculata, Cyperus* spp., *Deschampsia beringensis, Deschampsia cespitosa, Eleocharis obtusa, Eleocharis palustris, Elymus trachycaulus, Eragrostis hypnoides, Glyceria striata, Juncus arcticus ssp. littoralis (= Juncus balticus), Juncus lesueurii, Leymus cinereus, Leymus mollis, Muhlenbergia richardsonis, Pascopyrum smithii, Paspalum distichum, Phalaris* spp., *Poa cusickii, Poa secunda (= Poa nevadensis), Schoenoplectus americanus, Schoenoplectus pungens, Typha domingensis*, and *Typha latifolia*; forbs *Achillea millefolium var. borealis (= Achillea borealis), Angelica lucida, Argentina anserina (= Potentilla anserina), Argentina egedii, Bidens* spp., *Castilleja* spp., *Cicuta* spp., *Crassula aquatica, Euthamia occidentalis, Galium triflorum, Gnaphalium palustre, Heracleum maximum, Hydrocotyle umbellata, Iris missouriensis, Lathyrus japonicus var. maritimus, Lilaeopsis occidentalis, Limosella aquatica, Ludwigia palustris, Lupinus nootkatensis, Lysichiton americanus, Maianthemum stellatum, Mimulus* spp., and *Parnassia palustris*; ferns and fern allies *Athyrium filix-femina, Equisetum arvense, Equisetum fluviatile, Equisetum variegatum*, and *Gymnocarpium dryopteris*; and mosses *Sphagnum* spp.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: These wetlands are subject to flooding, groundwater discharge, or surface inundation, resulting from proximity to waterbodies, including tidal pulses of freshwater, or subsurface water due to high water table. Flooding may be accompanied by burial by sand and other coarse material. A fluctuating water table may expose some areas to scour by wind. They may be heavily inundated for at least part of the growing season, impeding the establishment of tree species. Isolated wetlands in dune systems are subject to changes in the size and location of the wet swales as the sand dunes shift with active dune migration.

ENVIRONMENT

Environmental Description: Environmental settings include seasonally flooded bottomlands along drainages, river floodplain depressions, glacial or other depressions, cienegas, oxbow lakes, seeps and springs, freshwater tidal-influenced shores of the Columbia River, frequently flooded gravel bars, low-lying sidebars, infilled side channels, small ponds, ditches, small interdunal depressions to extensive deflation plains behind stabilized foredunes, slow-moving streams, perennial streams in valleys and mountain foothills, and lakeshore mudflats. Elevations range from sea level to 1830 m (0-6000 feet). *Soil/substrate/hydrology:* Substrates are variable but are generally fine-textured, alluvial soil, coarse loam, sandy loam, sand, and silt. Hydrologic regimes vary from seasonal inundation followed by complete soil desiccation to year-round standing water. Water may be poorly oxygenated or nitrogen-rich and at or above the ground surface for most of the growing season. A consistent source of freshwater is essential to the function of these systems. Rarely, water is brackish.

DISTRIBUTION

\*Geographic Range: This macrogroup is found from the northernmost Aleutian Islands to Cook Inlet Basin and Prince William Sound, Alaska, south along the Pacific Coast to California, into the temperate western North American interior (interior British Columbia, Columbia Basin, Great Basin, Colorado Plateau, and higher intermountain basins) and in dune wetlands across the intermountain western U.S.

Nations: CA, MX?, US

States/Provinces: AB, AK, AZ, BC, CA, CO, ID, MT, NM, NV, OR, TX, UT, WA, WY

USFS Ecoregions (2007) [optional]: 242A:CC, 242B:CC, 313A:CC, 313B:CC, 313D:CC, 315A:CC, 315H:CC, 321A:CC, 322A:CC, 331A:CC, 331B:CC, 331D:CC, 331F:CC, 331G:CC, 331H:CC, 331I:CC, 331J:CC, 331K:C?, 331N:CP, 341A:CC, 341B:CC, 341C:CC, 341D:CC, 341E:CC, 341F:CC, 341G:CC, 342A:CC, 342B:CC, 342C:CC, 342D:CC, 342E:CC, 342F:CC, 342G:CC, 342H:CC, 342I:CC, 342J:CC, M242A:CC, M242B:CC, M242C:CC, M242D:CC, M261A:CC, M261D:CC, M261E:CC, M261G:CC, M313A:CC, M313B:CC, M331A:CC, M331B:CC, M331D:CC, M331E:CC, M331F:CC, M331G:CC, M331H:CC, M331I:CC, M331J:CC, M332A:CC, M332B:CC, M332D:CC, M332E:CC, M332F:CC, M332G:CC, M333A:CC, M333B:CC, M333C:CC, M333D:CC, M341A:CC, M341B:CC, M341C:CC, M341D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: Geographic range is really wide.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G525 | Temperate Pacific Freshwater Wet Mudflat |
| G517 | Vancouverian Freshwater Wet Meadow & Marsh |
| G322 | Vancouverian Wet Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Wetlands (217) | Shiflet 1994 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

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Acknowledgments [optional]:

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2. Shrub & Herb Vegetation

2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

M075. Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland

Type Concept Sentence: This macrogroup contains montane to subalpine and alpine wet meadows, marshes and wet shrublands throughout the Rocky Mountains of the U.S. and Canada, the Sierra Nevada, and Intermountain cordillera. Dominant species include graminoids such as *Calamagrostis canadensis, Carex scopulorum, Carex utriculata, Glyceria striata*, forbs such as *Caltha leptosepala, Dodecatheon jeffreyi, Sibbaldia procumbens*, and shrub species such as, but not limited to, *Alnus incana, Betula occidentalis, Betula glandulosa*, and many *Salix* species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Nb. Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (D031)

Elcode: M075

\*Scientific Name: *Alnus viridis ssp. sinuata / Carex utriculata* Marsh, Wet Meadow & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Sitka Alder / Northwest Territory Sedge Marsh, Wet Meadow & Shrubland Macrogroup

\*Colloquial Name: Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland

\*Type Concept: This macrogroup contains montane to subalpine and alpine wet meadows, marshes and wet shrublands throughout the Cascade Range, Olympic Mountains, Rocky Mountains, Sierra Nevada, the Basin and Range, and Alaska, at elevations ranging from 1000-3600 m (3300-12,000 feet). Wet meadows can be graminoid- or forb-dominated. Dominant graminoids include *Calamagrostis canadensis, Calamagrostis stricta, Carex aquatilis, Carex bolanderi, Carex exsiccata, Carex illota, Carex lachenalii, Carex lenticularis, Carex microptera, Carex nigricans, Carex scopulorum, Carex utriculata, Carex vernacula, Deschampsia cespitosa, Eleocharis quinqueflora, Eriophorum angustifolium, Glyceria striata, Juncus drummondii*, and *Juncus nevadensis*. Dominant forb species include *Caltha leptosepala, Camassia quamash, Cardamine cordifolia, Dodecatheon jeffreyi, Phippsia algida, Rorippa alpina, Senecio triangularis, Sibbaldia procumbens, Trifolium parryi, Trollius laxus*, and *Veratrum californicum*. Wet shrublands are tall to dwarf in stature, forming open to closed canopies and include dominant species such as *Alnus incana, Alnus oblongifolia, Alnus viridis, Betula occidentalis, Betula glandulosa, Cornus sericea, Salix barclayi, Salix bebbiana, Salix boothii, Salix brachycarpa, Salix commutata, Salix drummondiana, Salix eriocephala, Salix farriae, Salix geyeriana, Salix monticola, Salix planifolia, Salix sitchensis*, and *Salix wolfii*. Sites are generally wet all season long but some dry out by summer's end, others remain saturated for much of the year. Montane marshes, from beaver dams and along shorelines, can be quite common, and are dominated by *Carex aquatilis, Carex atherodes, Carex lenticularis, Carex rostrata* (although rare), *Carex utriculata*, and *Schoenoplectus* spp.

\*Diagnostic Characteristics: Open to dense herbaceous wet meadows and open to closed-canopy wet shrublands of all statures (tall to dwarf) at montane and subalpine elevations (1000-3600 m [3300-12,000 feet]). These may occur at the edge of or finger into alpine elevations of western mountain ranges.

\*Classification Comments: Some of the species included (*Alnus incana, Salix drummondiana*, etc.) can occur on high-gradient streams.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |

Similar NVC Types General Comments [optional]: M073 (occurs at lower elevations with a different to slightly overlapping suite of species.); M099 (are alpine turf, fell-fields and dwarf-shrublands that are generally drier, and are not considered true wetlands.); M101 (is generally drier and not considered true wetlands.); M168 & M888.

VEGETATION

Physiognomy and Structure Summary: This macrogroup is variable structurally and includes open to dense graminoid- and forb-dominated herbaceous stands as well as stands dominated by shrubs of all height classes, including dwarf-shrubs.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This macrogroup consists of wet meadows (graminoid- or forb-dominated), marshes and wet shrublands. Dominant graminoids include *Calamagrostis canadensis, Calamagrostis stricta, Carex aquatilis, Carex bolanderi, Carex exsiccata, Carex illota, Carex lachenalii, Carex microptera, Carex nigricans, Carex scopulorum, Carex utriculata, Carex vernacula, Deschampsia cespitosa, Eleocharis quinqueflora, Eriophorum angustifolium, Glyceria striata (= Glyceria elata), Juncus drummondii*, and *Juncus nevadensis*. Dominant forb species include *Caltha leptosepala, Camassia quamash, Cardamine cordifolia, Dodecatheon jeffreyi, Phippsia algida, Rorippa alpina, Senecio triangularis, Sibbaldia procumbens, Trifolium parryi, Trollius laxus*, and *Veratrum californicum*. Dominant shrub species include *Alnus incana, Alnus oblongifolia, Alnus viridis, Betula occidentalis, Betula glandulosa, Cornus sericea, Dasiphora fruticosa ssp. floribunda, Salix barclayi, Salix bebbiana, Salix boothii, Salix brachycarpa, Salix commutata, Salix drummondiana, Salix eastwoodiae, Salix eriocephala, Salix geyeriana, Salix monticola, Salix orestera, Salix planifolia, Salix pulchra*, or *Salix richardsonii (= Salix lanata ssp. richardsonii), Salix sitchensis*, and *Salix wolfii*. Scattered to moderately dense heath shrubs may be present in wet meadows, especially *Kalmia microphylla, Vaccinium macrocarpon*, or *Vaccinium uliginosum*. Montane marshes, from beaver dams and along shorelines, can be quite common, and are dominated by *Carex aquatilis, Carex atherodes, Carex lenticularis, Carex rostrata* (although rare), *Carex utriculata*, and *Schoenoplectus* spp.  
  
Floristic information was compiled from Willard (1963), Komarkova (1976, 1986), Padgett (1982), Nachlinger (1985), Cooper (1986b), Kovalchik (1987, 1993, 2001), Baker (1988, 1989a, 1989b, 1990), Barbour and Major (1988), Meidinger et al. (1988), Padgett et al. (1988a, 1988b), Reed (1988), Lloyd et al. (1990), Meidinger and Pojar (1991), Banner et al. (1993), DeLong et al. (1993), Kittel (1993, 1994), Shiflet (1994), Manning and Padgett (1995), Sawyer and Keeler-Wolf (1995), Kittel et al. (1996, 1999a, 1999b), Sanderson and Kettler (1996), Walford (1996), Zwinger and Willard (1996), Cooper et al. (1997), Crowe and Clausnitzer (1997), Steen and Coupe (1997), Muldavin et al. (2000a), and MacKenzie and Moran (2004).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

Seepage and subsurface irrigation are typical hydrological drivers of this system. Interannual variation in extent of winter precipitation and period of snowmelt may impact seasonal water levels influencing the mosaic or dominance of wet meadows and wet shrublands. Where beaver are present, their activity can modify successional dynamics, e.g., shrublands can be converted to open water and/or meadows by beaver activity, and abandoned habitat may revert to shrublands over time. Montane wetlands can be tolerant and resilient after moderate-intensity surface fires as well as late-season livestock grazing (Kovalchik 1987). Wetlands can also be negatively affected by intensive, continuous livestock grazing. Where this occurs, the result can be a shift in species composition, increased non-natives, xerification, compacted soils, increased soil erosion, and slope failures.

ENVIRONMENT

Environmental Description: This macrogroup predominantly occurs on wet sites with very low-gradient surface and subsurface flows, but shrublands can also form narrow bands along high-gradient streams. These freshwater marshes occur on the margins of abandoned channels, floodplains, ponds, lakes, and riparian systems and on inland deltas where rivers drain into large lakes. They occur at montane and subalpine elevations and may occur at the edges of or finger into alpine elevations. Elevation range is about 1000-3600 m in western mountain ranges. These communities occur as large meadows in subalpine valleys, as narrow bands lining sinuous streambanks and alluvial terraces in narrow to wide, low-gradient valley bottoms and floodplains, as narrow rings around ponds and lakes, and as open meadows along toeslope seeps. They are typically found on flat areas or gentle slopes, but may also occur on subirrigated sites, or adjacent to rocky streams with slopes up to 20%. In upper subalpine and alpine regions, sites typically are small depressions located below late-melting snow patches or on snowbeds. Soils of this macrogroup are mineral or with a thin (<40 cm) organic layer over mineral layers (that is, not a peatland). Salinity and alkalinity are generally low (but are on occasion high) due to the frequent flushing of moisture through the meadow. These wetlands may form complexes with peatlands and forested swamps. These swamps also occur throughout the boreal and boreal transition regions of Alaska on poorly drained, fine-textured soil with an abundant surface flow. Landscapes include inactive floodplain channels and margins of peatlands. Depressions with standing water are common throughout the growing season. Soils range from muck to mineral and are relatively nutrient-rich. Some sites have a thin peat layer, then to be slightly to highly alkaline.

DISTRIBUTION

\*Geographic Range: This macrogroup is found throughout the Rocky Mountain, Pacific Northwest and Intermountain West regions. Mountain ranges include the Rocky Mountain cordillera from New Mexico north into Montana, the Canadian Rockies of Alberta and British Columbia, the mountains and valleys of the Basin and Range and high areas of the Colorado Plateau, Olympic Mountains, Cascade Range and Sierra Nevada, and extends into Alaska. It also contains groups that occur in the boreal and boreal transition areas of Alaska and British Columbia, extending east into Alberta, Saskatchewan, and Manitoba and south into Idaho, Montana, North Dakota and Minnesota.

Nations: CA, MX?, US

States/Provinces: AB, AK, AZ, BC, CA, CO, ID, MB, MN, MT, ND, NM, NV, OR, SD, SK, UT, WA, WY, YT

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: Geographic range is really wide.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel, J. Triepke, K.A. Schulz, P. Comer, T. Boucher

Acknowledgments [optional]:

Version Date: 29 Mar 2017

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2. Shrub & Herb Vegetation

2.C.4.Nc. Southwestern North American Warm Desert Freshwater Marsh & Bosque

D032. Southwestern North American Warm Desert Freshwater Marsh & Bosque

Type Concept Sentence: Herbaceous marshes and riparian shrublands found throughout canyons and desert valleys of the warm desert regions of the southwestern U.S. and adjacent Mexico.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.4.Nc. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland (F013)

Elcode: D032

\*Scientific Name: *Prosopis glandulosa / Typha domingensis - Schoenoplectus pungens* Southwestern North American Warm Desert Freshwater Marsh & Bosque Division

\*Common (Translated Scientific) Name: Honey Mesquite / Southern Cattail - Common Threesquare Southwestern North American Warm Desert Freshwater Marsh & Bosque Division

\*Colloquial Name: Southwestern North American Warm Desert Freshwater Marsh & Bosque

\*Type Concept: This division covers herbaceous marshes and riparian shrublands widely distributed throughout canyons and desert valleys of the warm desert regions of the southwestern U.S. and adjacent Mexico. Riparian shrublands are found in riparian corridors of small, medium and large perennial and intermittent streams and rivers at low elevations (<1100 m). The vegetation is low scrub or shrub, not tall trees. Dominant scrub species are *Prosopis glandulosa* and *Prosopis velutina*, and dominant shrubs include *Baccharis salicifolia, Pluchea sericea, Salix geyeriana, Shepherdia argentea*, and *Salix exigua*. Woody vegetation is relatively dense, especially when compared to drier washes. Marsh vegetation is characterized by a lush, dense herbaceous layer with low diversity occurring sometimes as a monoculture. Dominant species include *Carex pellita, Carex praegracilis, Cyperus* spp., *Distichlis spicata, Eleocharis palustris, Flaveria chlorifolia, Helianthus paradoxus, Juncus arcticus ssp. littoralis, Paspalum distichum, Ranunculus aquatilis, Schoenoplectus americanus, Schoenoplectus pungens*, and *Typha domingensis*. Marsh vegetation occurs in bottomlands along drainages, in river floodplain depressions, cienegas, oxbow lakes, below seeps, on frequently flooded gravel bars, low-lying sidebars, infilled side channels, small ponds, stockponds, ditches and slow-moving streams, and perennial streams in valleys and mountain foothills, from 890 to 1560 m (2930-5120 feet) in elevation. Marsh substrates are variable but are generally fine-textured and often alkaline. Hydrologic regimes vary from seasonal inundation followed by complete soil desiccation to year-round standing water.

\*Diagnostic Characteristics: Desert climes of the southwestern U.S., seasonal inundation or at least near-surface or sub-surface water table saturation, characterized by emergent herbaceous vegetation, or intermittent and perennial streambanks and floodplains with native woody shrub species. Dominant scrub species are *Prosopis glandulosa* and *Prosopis velutina*, and dominant shrubs include *Baccharis salicifolia, Pluchea sericea, Salix exigua, Salix geyeriana*, and *Shepherdia argentea*. Dominant marsh species include *Carex pellita, Carex praegracilis, Cyperus* spp., *Distichlis spicata, Eleocharis palustris, Flaveria chlorifolia, Helianthus paradoxus, Juncus arcticus ssp. littoralis, Paspalum distichum, Ranunculus aquatilis, Schoenoplectus americanus, Schoenoplectus pungens*, and *Typha domingensis*.

\*Classification Comments: Vegetation is dependent upon annual rise in the water table or annual/periodic flooding/saturation.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D031 | Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland | includes marshes and shrubby riparian areas that occur in temperate and boreal climates further north. |
| D323 | Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The riparian shrublands are dominated by low scrub trees or shrubs, not tall trees. Woody vegetation is relatively dense, especially when compared to drier washes. The marsh vegetation is characterized by a lush, dense herbaceous layer with low diversity, occurring sometimes as a monoculture.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Dominant scrub species are *Prosopis glandulosa* and *Prosopis velutina*, and dominant shrubs include *Baccharis salicifolia, Pluchea sericea, Salix exigua, Salix geyeriana*, and *Shepherdia argentea*. Dominant marsh species include *Carex pellita (= Carex lanuginosa), Carex praegracilis, Cyperus* spp., *Distichlis spicata, Eleocharis palustris, Flaveria chlorifolia, Helianthus paradoxus, Juncus arcticus ssp. littoralis (= Juncus balticus), Paspalum distichum, Ranunculus aquatilis, Schoenoplectus americanus, Schoenoplectus pungens*, and *Typha domingensis*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: *Soils/substrate:* Riparian shrublands are found in riparian corridors of small, medium and large perennial and intermittent streams and rivers at low elevations (<1100 m). Marsh vegetation occurs in bottomlands along drainages, in river floodplain depressions, cienegas, oxbow lakes, below seeps, on frequently flooded gravel bars, low-lying sidebars, infilled side channels, small ponds, stockponds, ditches and slow-moving streams, and perennial streams in valleys and mountain foothills, from 890 to 1560 m (2930-5120 feet) in elevation. Marsh substrates are variable but are generally fine-textured and often alkaline. Hydrologic regimes vary from seasonal inundation followed by complete soil desiccation to year-round standing water.

DISTRIBUTION

\*Geographic Range: This division is found in desert climes of the southwestern U.S., including Trans-Pecos Texas, Colorado, Arizona, and New Mexico, and adjacent Mexico.

Nations: MX, US

States/Provinces: AZ, CA, CO, MXBC, MXCH, MXSO, NM, NV, TX

USFS Ecoregions (2007) [optional]: 313:C, 315:C, 321:C, 322:C, 341:P, M261:C, M313:P

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M076 | Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: W.J. Mitsch and J.G. Gosselink (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 06 Jan 2016

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Barbour, M. G., and W. D. Billings, editors. 2000. North American terrestrial vegetation. Second edition. Cambridge University Press, New York. 434 pp.

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

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2. Shrub & Herb Vegetation

2.C.4.Nc. Southwestern North American Warm Desert Freshwater Marsh & Bosque

M076. Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence: This macrogroup includes desert freshwater wetlands, including low-statured *Prosopis glandulosa* and *Prosopis velutina* stands and shrubby areas of *Baccharis emoryi, Baccharis salicifolia, Pluchea sericea, Salix lasiolepis, Shepherdia argentea*, and *Salix exigua*, along perennial and intermittent streams, lake or playa edges, and alkaline seeps and springs, at low elevations (>1100 m) in the warm desert regions of the southwestern U.S.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Nc. Southwestern North American Warm Desert Freshwater Marsh & Bosque (D032)

Elcode: M076

\*Scientific Name: Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland Macrogroup

\*Colloquial Name: Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept: This macrogroup of desert freshwater wetlands consists of low-elevation (<1100 m) wetlands where dominant scrub species are *Prosopis glandulosa* and *Prosopis velutina*, and other shrubs include *Baccharis emoryi, Baccharis salicifolia, Pluchea sericea, Salix geyeriana, Salix lasiolepis, Shepherdia argentea*, and *Salix exigua*. Woody vegetation is relatively dense, especially when compared to drier washes. These wetlands occur along perennial and intermittent streams, lake or playa edges, and alkaline seeps and springs. Vegetation, especially the mesquites, tap into groundwater below the streambed when surface flows stop. Vegetation is dependent upon annual rise in the water table or annual/periodic flooding and associated sediment scour and/or annual rise in the water table for growth and reproduction. This macrogroup occurs in the warm desert regions of the southwestern U.S. and adjacent Mexico.

\*Diagnostic Characteristics: Desert climes of the southwestern U.S., intermittent and perennial streambanks, riverbanks and floodplains, alkaline springs and seeps, with native woody tree and shrub species.

\*Classification Comments: Further review of the differences between ~Chihuahuan Desert Scrub Macrogroup (M086)$$ (e.g., G287 and G299) is needed since some associations appear to cross Chihuahuan, Sonoran, and Mojave deserts.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M036 | Interior Warm & Cool Desert Riparian Forest |  |
| M074 | Western North American Vernal Pool |  |
| M073 | Vancouverian Lowland Marsh, Wet Meadow & Shrubland | is dominated by vegetation indicative of higher elevations and cold-temperate zones. |
| M086 | Chihuahuan Desert Scrub | overlaps in floristics and ecology, including associations with *Prosopis glandulosa* and *Prosopis velutina*. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Scrubby growth of short bosque or thickets of drought-deciduous shrubs along lower elevation stream courses.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Dominant scrub/trees include *Prosopis glandulosa, Prosopis pubescens*, and *Prosopis velutina*. Dominants of shrub communities include *Baccharis emoryi, Baccharis salicifolia, Baccharis sergiloides, Pluchea sericea, Salix geyeriana, Salix lasiolepis, Shepherdia argentea*, and *Salix exigua*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Vegetation is dependent upon occasional rise in the water table or annual/periodic flooding and associated sediment scour and/or annual rise in the water table for growth and reproduction (Szaro 1989, Muldavin et al. 2000b).

ENVIRONMENT

Environmental Description: *Climate:* Mild, low-elevation arid southwestern deserts. *Soil/substrate/hydrology:* Low-elevation (<1100 m) riparian corridors along perennial and intermittent streams and rivers throughout canyons and desert valleys with alluvial soils, lakeshores, playa edges with high water tables, and alkaline spring/seeps.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs in the warm desert regions of the southwestern U.S. and adjacent Mexico. Rivers include the lower Colorado (into the Grand Canyon), Gila, Santa Cruz, Salt, lower Rio Grande (below Elephant Butte Reservoir in New Mexico to the coastal plain of Texas), and the lower Pecos (up to near its confluence with Rio Hondo in southeastern New Mexico) and their tributaries that occur in the desert portions of their range, and various rivers in southern and central California.

Nations: MX, US

States/Provinces: AZ, CA, MXBC, MXCH, MXSO, NM, NV, TX

USFS Ecoregions (2007) [optional]: 313A:CC, 313C:CC, 315A:CC, 315B:CC, 321A:CC, 322A:CC, 322B:CC, 322C:CC, 341F:PP, M261E:CC, M313A:PP, M313B:PP

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G545 | Colorado Plateau Hanging Garden Seep |
| G533 | North American Warm Desert Riparian Low Bosque & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D.E. Brown (1982a)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

D323. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

Type Concept Sentence: This division consists of vegetation in eastern cool-temperate and boreal North America, including the Great Plains. Stands are dominated by shrubs and/or non-hydromorphic herbaceous plants that are facultatively to obligately adapted to freshwater wetland conditions and that grow in mineral or mucky organic soils with regular (intermittent to permanent) saturated and flooded conditions.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.4.Nd. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland (F013)

Elcode: D323

\*Scientific Name: *Salix interior / Juncus* spp. - *Eupatorium perfoliatum* Wet Meadow & Shrubland Division

\*Common (Translated Scientific) Name: Sandbar Willow / Rush speices - Common Boneset Wet Meadow & Shrubland Division

\*Colloquial Name: Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

\*Type Concept: This division consists of vegetation in eastern cool-temperate North America, including the Great Plains, and excluding the Atlantic and Gulf coastal plains. It is dominated by shrubs and/or non-hydromorphic herbaceous plants that are facultatively to obligately adapted to freshwater wetland conditions and that grow in mineral or mucky organic soils with regular (intermittent to permanent) saturated conditions. In general, this comprises vegetation of most of the cool-temperate freshwater wetlands of eastern North America, excluding bogs, poor fens, and tidal marshes. Genera that are fairly diagnostic of this division include *Acorus, Alisma, Beckmannia, Boehmeria, Calla, Callitriche, Caltha, Cephalanthus, Chelone, Chrysosplenium, Cicuta, Cladium, Cyperus, Dulichium, Echinochloa, Eleocharis, Epilobium* (in the strict sense), *Eriocaulon, Eupatorium, Fimbristylis, Fuirena, Gentiana, Gratiola, Glyceria, Hydrocotyle, Juncus, Justicia, Lindernia, Ludwigia, Lycopus, Mentha, Mikania, Mimulus, Nasturtium, Onoclea, Osmunda, Oxypolis, Parnassia, Peltandra, Phalaris, Pilea, Platanthera* (in the strict sense), *Pontederia, Ptilimnium, Rorippa, Sagittaria, Saururus, Schoenoplectus, Scirpus, Scolochloa, Sium, Sparganium, Symplocarpus, Typha, Utricularia, Veratrum, Woodwardia, Xyris*, and *Zizania*. Many individual species of *Carex* also are diagnostic, and strong dominance by one or more species of this genus usually indicates vegetation of this division. The division includes vegetation that occurs in shrub swamps, seepages, wet meadows, marshes, alluvial banks and bars, pond- and lakeshores, and playas. The hydrologic regime ranges from intermittently flooded, temporarily flooded, seasonally flooded, saturated, semipermanently flooded, intermittently exposed, and permanently flooded.

\*Diagnostic Characteristics: Stands of this division have a shrub or herbaceous physiognomy and a composition with a predominance of facultative to obligate wetland plant species (Lichvar et al. 2014) that occur on a substrate that is regularly flooded or saturated by freshwater in eastern temperate and boreal North America east of the Rocky Mountains and Chihuahuan Desert, and north of the Atlantic and Gulf coastal plains.

Within its range, vegetation of this division (D323) is approximately equivalent to the concept of hydrophytic vegetation, as determined by a prevalence index score of 3.0 or less (Wentworth et al. 1988, USACE 2010a, 2010b, 2012a, 2012b) and by wetland plant ratings of Lichvar et al. (2014). This vegetation greatly overlaps, but is not equivalent to, the concept of hydrophytic vegetation, as determined by the dominance (50/20) test of USACE (1987, 2010a, 2010b, 2012a, 2012b). Hydrophytic vegetation, as determined by the dominance test, includes some upland vegetation that is dominated by facultative hydrophytes (e.g., *Abies balsamea, Acer rubrum*). Hydric soil and wetland hydrology indicators (USACE 1987, 2010a, 2010b, 2012a, 2012b) are usually, but not always present in stands that can be attributed to this division.

Genera that are fairly diagnostic of this division (D323), except where it abuts the range of 2.C.4.Ne ~Atlantic & Gulf Coast Freshwater Wet Prairie, Marsh & Shrubland Division (D322)$$ include *Acorus, Alisma, Beckmannia, Boehmeria, Calla, Callitriche, Caltha, Cephalanthus, Chelone, Chrysosplenium, Cicuta, Cladium, Cyperus, Dulichium, Echinochloa, Eleocharis, Epilobium* (in the strict sense), *Eriocaulon, Eupatorium, Fimbristylis, Fuirena, Gentiana, Gratiola, Glyceria, Hydrocotyle, Juncus, Justicia, Lindernia, Ludwigia, Lycopus, Mentha, Mikania, Mimulus, Nasturtium, Onoclea, Osmunda, Osmundastrum, Oxypolis, Parnassia, Peltandra, Phalaris, Pilea, Platanthera* (in the strict sense), *Pontederia, Ptilimnium, Rorippa, Sagittaria, Saururus, Schoenoplectus, Scirpus, Scolochloa, Sium, Sparganium, Symplocarpus, Typha, Utricularia, Veratrum, Woodwardia, Xyris*, and *Zizania*. Many individual species of *Carex* also are diagnostic, and strong dominance by one or more species of this genus usually indicates vegetation of this division.

\*Classification Comments: The eastern boreal group was added to this type after the main description was written, and are not reflected in the description. The distinction between this division (D323) and 2.C.4.Ne ~Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland Division (D322)$$ probably warrants additional review clarification. Presently, the latter includes some freshwater wetland vegetation of cool-temperate climates on the northern Atlantic Coastal Plain (i.e., ~Northern & Mid-Atlantic Coastal Wetland Group (G752)$$ which occurs from Virginia to the Maritime Provinces) that may be more related to vegetation of this cool-temperate division than to warm-temperate vegetation on the southeastern Atlantic and Gulf coastal plains. A cool-temperate versus warm-temperate (latitude) distinction between the divisions should be examined as an alternative that may provide more diagnostic consistency than the geomorphic (Coastal Plain or not) distinction.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D023 | Central North American Grassland & Shrubland | Stands of D323 may intergrade with [upland] stands of D024. In many cases, the hydrophytic vegetation criterion of a prevalence index score of 3.0 or less (Wentworth et al. 1988, USACE 2010a, 2010b, 2012a, 2012b) often is a reasonably accurate diagnostic feature for distinguishing vegetation of the former from the upland division. |
| D024 | Eastern North American Grassland & Shrubland | Stands of D323 may intergrade with [upland] stands of D024. In many cases, the hydrophytic vegetation criterion of a prevalence index score of 3.0 or less (Wentworth et al. 1988, USACE 2010a, 2010b, 2012a, 2012b) often is a reasonably accurate diagnostic feature for distinguishing vegetation of the former from that of the upland division. |
| D029 | North American Bog & Fen | Stands of D323 may intergrade with those of D029 in the northeastern United States and southeastern Canada. The former usually occur on mineral soils or mucky Histosols, whereas the latter are usually on peaty Histosols. In this area, D029 is characterized by the predominance of peatland-favoring vascular species such as *Andromeda polifolia, Carex exilis, Carex lasiocarpa, Carex livida, Carex magellanica ssp. irrigua, Carex michauxiana, Carex oligosperma, Carex sterilis, Chamaedaphne calyculata, Dasiphora fruticosa ssp. floribunda, Drosera* spp., *Eriophorum* spp., *Kalmia angustifolia, Kalmia polifolia, Ledum groenlandicum, Rhynchospora alba, Sarracenia purpurea, Trichophorum alpinum*, and/or *Vaccinium oxycoccos*, and of bryophytes such as *Aulacomnium palustre, Campylium stellatum, Scorpidium scorpioides, Sphagnum capillifolium, Sphagnum centrale, Sphagnum contortum, Sphagnum cuspidatum, Sphagnum fuscum, Sphagnum magellanicum, Sphagnum papillosum, Sphagnum rubellum, Sphagnum teres, Sphagnum warnstorfii*, and/or *Tomentypnum nitens*. |
| D031 | Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland | The range of D323 abuts that of D031 where the eastern foot of the Rocky Mountains meets the western edge of the Great Plains in Alberta, Montana, Wyoming, Colorado, and New Mexico. Generally, the predominance of Great Plains species (e.g., *Artemisia cana ssp. cana, Carex emoryi, Elaeagnus angustifolia, Panicum virgatum, Pascopyrum smithii, Salix interior* (in the strict sense), *Schoenoplectus pungens, Shepherdia argentea, Spartina pectinata*) will indicate the former, while the predominance of montane species (e.g., *Alnus incana ssp. tenuifolia, Betula occidentalis, Salix geyeriana, Salix irrorata, Salix monticola*) will indicate the latter. |
| D032 | Southwestern North American Warm Desert Freshwater Marsh & Bosque | The range of D323 abuts that of D032 in Texas and New Mexico where the southwestern Great Plains or the Edwards Plateau meet the Chihuahuan Desert region. Generally the predominance of [cold-tolerant] Great Plains species (e.g., *Carex emoryi, Elaeagnus angustifolia, Panicum virgatum, Spartina pectinata*) and eastern temperate region species (e.g., *Justicia americana*) will indicate the former, while the predominance of less cold-tolerant] desert species (e.g., *Arundo donax, Baccharis salicifolia, Muhlenbergia rigens, Prosopis* spp., *Pluchea sericea, Tamarix* spp.) will indicate the latter. |
| D322 | Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland | The range of D323 abuts that D322 in the Atlantic and Gulf coastal plains from the Maritime Provinces to Texas. Generally, species that are restricted to the coastal plains (e.g., *Amaranthus cannabinus, Carex hyalinolepis, Cladium mariscus ssp. jamaicense, Eleocharis equisetoides, Ilex glabra, Leersia hexandra, Morella cerifera, Nelumbo lutea, Panicum hemitomon, Panicum tenerum, Proserpinaca pectinata, Spartina cynosuroides, Vaccinium formosum, Vaccinium fuscatum, Zizaniopsis miliacea*) will indicate stands of D322. Genera such as *Andropogon, Eriocaulon, Fimbristylis, Fuirena, Paspalum, Rhynchospora, Sarracenia*, and *Xyris* have greater prominence and a higher diversity of species in D322, in the southern part of the ranges of the two divisions. The floristic distinctions between the divisions in the northern part of their ranges, where there are fewer characteristically warm-temperate taxa, is not as clear. |
| D320 | Arctic Freshwater Marsh & Wet Meadow | The range of D323 extends to that of D320 in the boreal region of Canada (outside the scope of the USNVC). The two divisions share a number of dominant species (e.g., *Calamagrostis canadensis, Carex aquatilis, Carex utriculata*), and the floristic distinctions between the divisions within the boreal region are not clear. |
| D033 | North American Great Plains Saline Marsh | Stands of D323 may intergrade with those of D033 in the Great Plains where saline playas, flats or marshes occur, and stands attributable to the different divisions may share species (e.g., *Hordeum jubatum, Pascopyrum smithii, Schoenoplectus pungens*). D033 is characterized by the importance of high salinity or alkalinity -species (e.g., *Atriplex patula, Distichlis spicata, Muhlenbergia asperifolia, Poa arida, Puccinellia nuttalliana, Salicornia rubra, Sarcobatus vermiculatus, Schoenoplectus americanus, Bolboschoenus maritimus, Sporobolus airoides, Suaeda calceoliformis*). |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This vegetation typically is dominated by some combination of shrubs and/or herbs, sometimes with scattered trees. Trees from adjacent upland stands may overhang small stands and provide shade. Occasionally, bryophytes (e.g., *Sphagnum* spp.) may be important. Where present, a shrub layer may be either tall (e.g., up to 8 m) or short (<2 m). Herbaceous layers often are dominated by graminoids (grasses sedges, rushes, cattails, and others) that are short to tall (e.g., up to 5 m) but can also be forb-dominated, especially in shadier settings. Vegetation density is usually moderately high to high, but some stands, especially those that experience prolonged inundation, along with substrate disturbance (e.g., on alluvial bars or lakeshores) can be quite sparse (e.g., <1% cover). In larger wetland complexes with gradual (gently sloping) transitions to upland along their boundaries, several different vegetation types, aligned along the hydroperiod gradient, may occur within close proximity (e.g., marsh to wet meadow to shrub swamp).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The floristic composition of vegetation of this division is exceedingly diverse. The following description accounts for the most frequent and widespread taxa. For taxa named at the species level, the predominant wetland regions (as defined by U.S. Army Corps of Engineers (2010a, 2010b, 2012a, 2012b) (Lichvar et al. 2014)) in which they occur are listed in parentheses. These regions are: (1) Northcentral and Northeast (NCNE), (2) Eastern Mountains and Piedmont (EMP), (3) Midwest (MW), and (4) Great Plains (GP). In turn, these regions approximately correspond to the following floristic areas of McLaughlin (2007), as they occur within the range of this USNVC division: (1) the Canadian Province, (2) the Appalachian and Austroriparian (in part) subprovinces of the Carolina Province, (3) the Illinoian subprovince of the Carolina Province, and (4) the Saskatchewan, Kansan, and Comanchian subprovinces of the Great Plains Province (GP). The Great Plains area is the region that is most divergent in floristic composition from the rest of the division. Eastern boreal stands were added to this type after the main description was written, and are not reflected in the list below.

Frequent shrub species include *Acer rubrum* (NCNE, EMP, MW), *Alnus incana ssp. rugosa* (NCNE), *Alnus serrulata* (NCNE, EMP), *Amelanchier canadensis* (NCNE, EMP), *Amorpha fruticosa* (EMP, MW, GP), *Artemisia cana ssp. cana* (GP), *Betula nigra* (EMP, MW), *Cephalanthus occidentalis* (NCNE, EMP, MW), *Clethra alnifolia* (NCNE, EMP), *Cornus sericea (= Cornus alba)* (NCNE, GP), *Cornus amomum* (EMP, MW), *Cornus racemosa* (NCNE, EMP, MW), *Dasiphora fruticosa ssp. floribunda* (NCNE), *Hypericum densiflorum* (EMP), *Hypericum prolificum* (EMP, MW), *Ilex verticillata* (NCNE, EMP, MW), *Lindera benzoin* (NCNE, EMP, MW), *Lonicera villosa* (NCNE), *Lyonia ligustrina* (NCNE, EMP), *Myrica gale* (NCNE), *Physocarpus opulifolius* (NCNE, EMP, MW), *Rhododendron arborescens* (EMP), *Rhododendron viscosum* (NCNE, EMP), *Ribes* spp. (NCNE), *Rosa palustris* (NCNE, EMP, MW), *Salix* spp., *Salix discolor, Salix interior, Sambucus nigra ssp. canadensis, Sanguisorba canadensis* (NCNE), *Spiraea alba var. latifolia* (NCNE, EMP), *Spiraea tomentosa* (NCNE, EMP, MW), *Toxicodendron vernix* (NCNE, EMP, MW), *Vaccinium corymbosum* (NCNE, EMP, MW), *Viburnum dentatum* (EMP, MW), *Viburnum nudum* (NCNE, EMP), and *Viburnum opulus var. americanum* (NCNE, MW). Non-native shrubs include *Elaeagnus angustifolia* (GP), *Frangula alnus* (NCNE, MW), *Ligustrum sinense* (EMP), *Lonicera* spp. (NCNE, EMP, MW), and *Rhamnus cathartica* (NCNE, MW, GP).

Many stands are dominated by or have an important component of graminoids; among the more prominent genera are *Acorus* (NCNE, MW, GP), *Carex* spp., *Cyperus* spp. , *Eleocharis* spp., *Glyceria* spp., *Juncus* spp., *Schoenoplectus* spp., *Scirpus* (all), *Sparganium* spp., *Typha* spp., and *Zizania* (NCNE, MW). Other herbaceous genera that are frequent include *Alisma* spp., *Bidens* spp., *Callitriche* spp., *Epilobium* spp., *Equisetum* spp., *Eupatorium* spp., *Eutrochium (= Eupatoriadelphus)* spp., *Fimbristylis* (NCNE, EMP, MW), *Gentiana* spp., *Gratiola* spp., *Helenium* spp., *Hydrocotyle* (NCNE, EMP, MW), *Lobelia* spp., *Lycopus* spp., *Mentha* spp., *Mimulus* spp., *Osmunda* (NCNE, EMP, MW), *Parnassia* (NCNE, EMP, MW), *Phyla* (EMP, MW, GP), *Platanthera* (NCNE, EMP, MW), *Polygonum* section *Persicaria (= Persicaria)* spp., *Ranunculus* spp., *Rhexia* (NCNE, EMP), *Rorippa* spp., *Sagittaria* spp., *Utricularia* spp., and *Woodwardia* (NCNE, EMP, MW).

Additional herbaceous species that are frequent across large areas of the range of the division include *Alopecurus aequalis* (NCNE, GP), *Andropogon glomeratus* (EMP), *Argentina anserina (= Potentilla anserina)* (NCNE, MW, GP), *Asclepias incarnata, Beckmannia syzigachne* (GP), *Boehmeria cylindrica* (NCNE, EMP, MW), *Calamagrostis canadensis* (NCNE, MW), *Calamagrostis coarctata* (EMP), *Calamagrostis stricta* (GP), *Calla palustris* (NCNE), *Caltha palustris* (NCNE, MW), *Campanula aparinoides* (NCNE, EMP, MW), *Cardamine bulbosa* (EMP, MW), *Cardamine pensylvanica* (NCNE, EMP, MW), *Chelone glabra* (NCNE, EMP, MW), *Chrysosplenium americanum* (NCNE, EMP), *Cicuta maculata, Cirsium muticum* (NCNE, EMP, MW), *Cladium mariscoides* (NCNE), *Clematis ligusticifolia* (GP), *Clematis virginiana* (NCNE, EMP, MW), *Commelina virginica* (EMP), *Deschampsia cespitosa* (NCNE), *Dichanthelium clandestinum* (NCNE, EMP, MW), *Diodia virginiana* (EMP), *Doellingeria umbellata* (NCNE, EMP, MW), *Dryopteris cristata* (NCNE, EMP, MW), *Dulichium arundinaceum* (NCNE, EMP, MW), *Echinochloa muricata, Eragrostis frankii* (EMP, MW), *Eragrostis hypnoides* (EMP, MW, GP), *Eriocaulon aquaticum* (NCNE), *Euthamia graminifolia, Fuirena simplex* (GP), *Galium asprellum* (NCNE, MW), *Galium tinctorium* (NCNE, EMP, MW), *Geum rivale* (NCNE), *Heracleum maximum* (NCNE, MW), *Hordeum jubatum* (NCNE, MW, GP), *Hypericum mutilum* (NCNE, EMP, MW), *Impatiens capensis* (NCNE, EMP, MW), *Iris versicolor* (NCNE), *Iris virginica* (EMP, MW), *Iva annua* (EMP, MW, GP), *Justicia americana* (EMP, MW), *Leersia oryzoides, Leptochloa fusca ssp. fascicularis (= Leptochloa fascicularis, = Diplachne fusca)* (MW, GP), *Lindernia dubia, Ludwigia alternifolia* (EMP, MW), *Ludwigia palustris* (NCNE, EMP, MW), *Lysimachia ciliata, Lysimachia terrestris* (NCNE, EMP, MW), *Menyanthes trifoliata* (NCNE), *Mikania scandens* (EMP), *Onoclea sensibilis* (NCNE, EMP, MW), *Osmunda cinnamomea (= Osmundastrum cinnamomeum)* (NCNE, EMP, MW), *Oxypolis rigidior* (EMP, MW), *Packera aurea* (NCNE, EMP, MW), *Panicum dichotomiflorum, Panicum rigidulum* (EMP, MW), *Panicum verrucosum* (EMP), *Panicum virgatum, Pascopyrum smithii* (GP), *Peltandra virginica* (NCNE, EMP, MW), Phalaris arundinacea, Phlox maculata (NCNE, EMP, MW), *Pilea pumila* (NCNE, EMP, MW), *Poa palustris* (NCNE, MW, GP), *Pontederia cordata* (NCNE, EMP, MW), *Ptilimnium capillaceum* (EMP), *Rhynchospora capitellata* (NCNE, EMP, MW), *Rubus pubescens* (NCNE), *Rudbeckia laciniata, Rumex aquaticus var. fenestratus (= Rumex occidentalis)* (GP), *Rumex verticillatus* (NCNE, EMP, MW), *Saururus cernuus* (EMP, MW), *Scolochloa festucacea* (GP), *Scutellaria lateriflora, Senecio congestus (= Tephroseris palustris)* (GP), *Sisyrinchium angustifolium* (NCNE, EMP, MW), *Sium suave, Solidago gigantea, Solidago patula* (NCNE, EMP, MW), *Solidago uliginosa* (NCNE), *Spartina pectinata* (NCNE, MW, GP), *Sphenopholis obtusata* (EMP, MW, GP), *Stachys pilosa* (NCNE, MW, GP), *Symplocarpus foetidus* (NCNE, EMP, MW), *Symphyotrichum lanceolatum* (NCNE, EMP, MW), *Symphyotrichum puniceum* (NCNE, EMP, MW), *Teucrium canadense, Thalictrum pubescens* (NCNE, EMP), *Thelypteris noveboracensis (= Parathelypteris noveboracensis)* (NCNE, EMP, MW), *Thelypteris palustris* (NCNE, EMP, MW), *Veratrum viride* (NCNE, EMP), *Vernonia noveboracensis* (NCNE, EMP), *Veronica scutellata* (NCNE), *Viola cucullata* (NCNE, EMP, MW), and *Viola macloskeyi ssp. pallens (= Viola pallens)* (NCNE, EMP). Introduced species include *Agrostis gigantea* (NCNE, EMP, MW), *Agrostis stolonifera, Arundo donax* (EMP), *Iris pseudacorus* (EMP, MW), *Lythrum salicaria* (NCNE, EMP, MW), *Lysimachia nummularia* (NCNE, EMP, MW), *Microstegium vimineum* (EMP, MW), *Phragmites australis ssp. americanus, Poa trivialis* (NCNE, EMP), *Polygonum cuspidatum (= Fallopia japonica, = Reynoutria japonica)* (NCNE, EMP, MW), *Nasturtium officinale, Veronica anagallis-aquatica*, and *Xyris montana* (NCNE).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The frequency and duration of saturation (hydroperiod) differentiate this vegetation from that of uplands and also plays a major factor in the determination of both floristic composition and vegetation physiognomy and structure. Increasing soil saturation leads to increasing anoxic stress, which is a significant local process that determines the composition of this vegetation. Longer periods of saturation or flooding favor taxa that are more tolerant of anoxic conditions and, in general, favors the persistence of a physiognomy dominated by herbaceous plants over one dominated by woody plants, and the persistence of shrubs over that of trees. Prolonged drought periods may reverse the vegetation trends that long hydroperiods favor. Erosion of existing substrate and deposition of new substrate is an important factor in some units of this division, particularly those associated with alluvial bars and lake shorelines with periodic disturbances from waves associated with storm surges. Human-induced changes in vegetation composition and structure can occur from lowering of water tables due to surface and groundwater withdrawal and to stream incision following excessive surface water runoff from land cover modifications. Invasive non-native species, which are especially prolific in alluvial settings with substrate turnover and upstream dams along riparian areas, can alter inundation and substrate turnover patterns in alluvial wetlands. For some types in the division, occasional natural fires may work in concert with anoxic stress to prevent establishment of trees.

ENVIRONMENT

Environmental Description: Settings most often are flat, depressed, or gently sloping terrain, where surface water collects, groundwater emerges, and/or to which surface water from large waterbodies (lakes, ponds streams, rivers) rises. Settings include marshes, wet meadows, shrub swamps, depressional swamps, seepages, alluvial bars, riverbanks, pondshores, lakeshores, and others. A key environmental factor is periodic (intermittent to permanent) soil saturation and flooding and anoxic stress on vegetation. Stands tend to be larger and more frequent in glaciated regions and near the Coastal Plain, where geomorphic processes have favored the development of gentle slopes (including basins) on which the rate of undrained surface water accumulation tends to be greater than in regions of higher topographic relief.

*Climate:* This vegetation is largely azonal in respect to climate, extending essentially throughout the full temperature range of cool-temperate and eastern boreal climates in eastern North America, from subtropical to boreal. Average annual temperature ranges from a high of about 19°C (66°F) (Columbus, GA) to around a low of 4°C (39°F) (Duluth, MN). Precipitation ranges from 100 to 160 cm (39-63 inches) per year in the eastern part of the range to about 5 to 6 cm (13-15 inches) per year at the western edge of the Great Plains. All other factors being equal, development of this vegetation is favored in climates with higher precipitation and cooler temperatures. The latter condition results in lower evapotranspiration rates of water (which allows more precipitation to become surface water). It also results in shorter periods of soil microbial activity that would otherwise reduce the amount of soil fine organic matter, the capacity of which to hold water exceeds that of most mineral soils (Mitsch and Gosselink 2000).

*Soils/substrate:* Stands occupy a wide range of soil textures from sands and gravels (e.g., on riparian bars and lakeshores with significant wave action) to clay loams and, rarely, clays (e.g., in seasonally flooded basins or non-riparian marshes). In some cases, an embedded fine-textured soil layer (e.g., a "clay pan" or "hardpan") may facilitate development of this vegetation. A variety of soil orders may support this vegetation, including Inceptisols (e.g., alluvial bars and lakeshores), Mollisols (e.g., wet prairies), Ultisols, and Entisols. The hydrologic regime ranges from intermittently flooded, temporarily flooded, seasonally flooded, saturated, semipermanently flooded, intermittently exposed, and permanently flooded (Cowardin et al. 1979). Where soils are consistently saturated to flooded (i.e., a saturated, semipermanently flooded or permanently flooded hydrologic regime), such as in marshes with low flow velocities and in seepages, an overlying layer of well decomposed organic matter (muck) may be present, particularly in the northern latitudes of the division; where soil muck is at least 40 cm (16 inches) deep, the soil is considered a Histosol. A condition common to all soils is at least periodic anoxic stress from saturation, which can range from intermittent to seasonal to permanent. Stands of this vegetation may occur on most of the surface geology types found in eastern temperate North America. These can produce a wide range of soil fertility and organic matter content, which, along with variation in climate and hydroperiods, accounts for much of the floristic diversity within the division.

*Biogeography:* This vegetation of this division is largely azonal as to climate and, therefore, biogeographically extensive. It represents a special case of shoreline-induced conditions that are common throughout the full temperature range of warm-temperate and cool-temperate climates in eastern North America, from subtropical to boreal. It occupies the Canadian [Floristic] Province and the Illinoian, Appalachian, and (in part) Austroriparian subprovinces of the Carolina [Floristic] Province, and Hudsonian subprovince of McLaughlin (2007).

DISTRIBUTION

\*Geographic Range: Vegetation of this division occurs throughout eastern North America, from the boreal zone to east of the Rocky Mountains and Chihuahuan Desert, and north and west of the Atlantic and Gulf coastal plains (essentially from Alberta to the Maritime Provinces in the north and from eastern New Mexico and southwestern Texas to Georgia in the south.

Nations: CA, MX, US

States/Provinces: AB, AL, AR, CO, CT, DC, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MB, MD, ME, MI, MN, MO, MS, MT, NB, NC, ND, NE, NF, NH, NJ, NM, NS, NY, OH, OK, ON, PA, PE, QC, RI, SC, SD, SK, TN, TX, VA, VT, WI, WV, WY

USFS Ecoregions (2007) [optional]: 211:C, 212:C, 221:C, 222:C, 223:C, 232:C, 251:C, 255:C, 315:C, 331:C, 332:C, M231:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M061 | Eastern North American Cool Temperate Seep |
| M069 | Eastern North American Marsh, Wet Meadow & Shrubland |
| M880 | Eastern North American Wet Shoreline Vegetation |
| M881 | Eastern North American Riverscour Vegetation |
| M071 | Great Plains Marsh, Wet Meadow, Shrubland & Playa |
| M303 | Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-11-26 | D030 Alnus spp. / Typha spp. - Carex spp. Eastern North American Freshwater Wet Meadow, Riparian & Marsh Division | D030 split into D322 & D323 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Emergent Wetland class, palustrine system | Cowardin et al. 1979 | Cowardin type occurs across the U.S. |
| >< | Scrub-Shrub Wetland class, Palustrine system | Cowardin et al. 1979 | Cowardin type occurs across the U.S. |
| >< | Unconsolidated Shore class, palustrine system | Cowardin et al. 1979 | Cowardin type occurs across the U.S. |
| = | combination of 232.1, 232.2 (in part), 233.1, 242.1, 242.3, 243.1, 252.1, 252.3, and 253.1 | Brown et al. 1998 | combination of Northeastern Deciduous Swamp Scrub (232.1), Plains and Great Basin Riparian Scrub (232.2) (in part), Southeastern Mixed Deciduous and Evergreen Swamp Scrub (233.1), Northeastern Interior Marshland (242.1), Plains Interior Marshland (242.3), Southeastern Interior Marshland (243.1), Northeastern Interior (Stream and Lake) Strand (252.1), Plains Stream and Lake Strand (252.3), and Southeastern Interior Strand (253.1) |
| = | combination of Deep Marsh, Shallow Marsh, Seasonally Flooded Flats, Meadow, and Shrub Swamp | Golet and Larson 1974 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: L.M. Cowardin, V. Carter, F.C. Golet, and E.T. LaRoe (1979)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Lea

Acknowledgments [optional]:

Version Date: 11 Jan 2016

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2. Shrub & Herb Vegetation

2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

M061. Eastern North American Cool Temperate Seep

Type Concept Sentence: These small-patch herbaceous to shrubby seep and seepage fen wetlands are found on flat to gentle slopes or in shallow depressions, often on peaty soils, predominantly on circumneutral to calcareous or acidic substrates (gravel, limestone, and dolomite), and range from the Appalachians, Interior Low Plateau, and Ozark regions north to New England and the Midwest-Great Lakes region.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (D323)

Elcode: M061

\*Scientific Name: *Dasiphora fruticosa ssp. floribunda - Sanguisorba canadensis / Carex interior* Seep Macrogroup

\*Common (Translated Scientific) Name: Shrubby-cinquefoil - Canadian Burnet / Inland Sedge Seep Macrogroup

\*Colloquial Name: Eastern North American Cool Temperate Seep

\*Type Concept: These are generally small-patch herbaceous to shrubby seepage wetlands found predominantly on circumneutral to somewhat alkaline to acidic sites, ranging from the Appalachians, Interior Low Plateau, and Ozark regions north to New England and the Midwest-Great Lakes region. North-central and northeastern seep vegetation is dominated by tall and short forbs, as well as by graminoids and *Sphagnum* mosses in some associations. Characteristic forbs include *Chelone* spp., *Impatiens capensis, Impatiens pallida, Rudbeckia laciniata*, and *Symplocarpus foetidus*; graminoids may also be present, including *Carex* spp., *Eriophorum virginicum*, and *Glyceria striata*. In the Ozarks region and Interior Plateau, characteristic herbaceous species include *Cardamine bulbosa, Carex interior, Carex lurida, Carex leptalea, Impatiens capensis, Parnassia grandifolia, Rudbeckia fulgida var. speciosa, Rudbeckia fulgida var. umbrosa, Scirpus atrovirens, Scirpus cyperinus, Spartina pectinata*, and *Thelypteris palustris var. pubescens*. Shrubs such as *Alnus serrulata* and *Salix* spp. may also occur. In the Central and Southern Appalachians, seepage fens are typically dominated by trees and shrubs. Some characteristic tree species include *Tsuga canadensis, Picea rubens, Acer rubrum, Nyssa sylvatica*, and *Pinus rigida*; some characteristic shrubs include *Alnus serrulata, Viburnum nudum var. cassinoides*, and *Toxicodendron vernix*. The habitats on which this type occurs are generally on flat to gently sloping terrain, on a variety of rock types, mostly typically limestone and dolomite, but also mafic and ultramafic igneous and metamorphic rocks, as well as less frequently acidic sedimentary rocks. Some soils are essentially a thin organic layer over limestone gravel, over a less permeable layer of more solid rock; the soil or substrate is saturated by groundwater, which may be circumneutral and of calcareous origin. To the north, the organic (peat) surface component of the substrate may be deeper than in the south. In the Central and Southern Appalachians, these sites occur at elevations below 1220 m (4000 feet) on soils which are often saturated and mucky, including in poorly drained bottomlands. Wetness results from a combination of groundwater input, seepage from adjacent slopes, rainfall and impeded drainage. In glaciated areas, examples are characteristically in pitted outwash or in kettle lakes associated with kettle-kame-moraine topography. North-central and northeastern seeps are linear, non-peaty, non-sphagnous, often rocky, groundwater slope wetlands that are embedded in an upland forest setting.

\*Diagnostic Characteristics: These are generally small-scale herbaceous to shrubby wetlands, distinctive and different from the surrounding matrix forest vegetation. They are typically on flat to gentle slopes or in shallow depressions, predominantly on mafic or calcareous substrates (occasionally acidic). The soils will have some organic content (more in the north, less to the south) and saturated primarily due to seepage. Characteristic plant species vary across the broad geographic range of the macrogroup. Ericaceous shrubs are typically unimportant, with *Alnus serrulata, Dasiphora fruticosa ssp. floribunda*, and *Viburnum nudum var. cassinoides* being diagnostic shrubs. Characteristic sedges and other graminoids (varying across the range) include *Calamagrostis canadensis, Carex atlantica, Carex canescens, Carex echinata, Carex folliculata, Carex gynandra, Carex leptalea, Carex lurida, Carex ruthii, Carex stricta, Carex scoparia, Carex trisperma, Cladium mariscoides, Eriophorum virginicum, Juncus gymnocarpus, Rhynchospora alba, Rhynchospora rariflora, Scirpus atrovirens*, and *Scirpus cyperinus*. Some characteristic forbs (varying across the range) include *Chelone glabra, Impatiens capensis, Impatiens pallida, Helenium brevifolium, Lilium grayi, Osmunda cinnamomea, Oxypolis rigidior, Packera aurea, Parnassia asarifolia, Parnassia grandifolia, Platanthera clavellata, Rudbeckia fulgida, Sarracenia rubra ssp. jonesii, Sarracenia oreophila, Scutellaria lateriflora, Solidago patula var. patula, Solidago uliginosa, Symphyotrichum puniceum, Symplocarpus foetidus, Thelypteris noveboracensis, Triantha glutinosa*, and *Woodwardia areolata*.

\*Classification Comments: The related but more northern ~Midwest Prairie Alkaline Fen Group (G183)$$ has been moved to ~North American Boreal & Subboreal Alkaline Fen Macrogroup (M877)$$ (alkaline peatland). This macrogroup (M061) now contains G182, G184, G189. This is a somewhat heterogeneous macrogroup, united by a common set of ecological processes, and a common set of mainly circumneutral to somewhat alkaline or acidic indicator species. Their small-patch characteristics, variable biogeographic settings and high species richness make it difficult to characterize their vegetation patterns. Our description highlights the regional patterns within the macrogroup, based on component group descriptions.

The associations in ~Central & Southern Appalachian Seep Group (G184)$$ are variously known locally as either "bogs" or "fens," (e.g., Richardson and Gibbons 1993), but their hydrology fits the definition of seepage fen, namely that they are groundwater-fed peatlands, with hydrologic and edaphic conditions ranging from acidic to alkaline. Except for the few examples with obvious calcareous groundwater input, the vegetation and flora are more characteristic of northern circumneutral to poor fens than of northern rich fens. All of these wetland associations are placed in ~Central & Southern Appalachian Seep Group (G184)$$. The considerable diversity in vegetation, substrate type, elevation, and environment among the members of this group requires that these issues be addressed at the alliance level.

~Central & Southern Appalachian Seep Group (G184)$$ is distinguished from ~North-Central & Northeastern Seep Group (G189)$$ by habitat and vegetation composition. Though both groups have heterogeneous and variable vegetation, they share few species. The setting also differs, with vegetation of ~Central & Southern Appalachian Seep Group (G184)$$ occurring on flat sites such as valley bottoms, where impeded drainage is important, while the seeps of G189 occur on sloping sites where waterflow is freer and more groundwater flow is needed to create a wetland. High-elevation wetlands in West Virginia are placed elsewhere.

~Midwest Prairie Alkaline Fen Group (G183)$$ can seem conceptually similar to ~Central & Southern Appalachian Seep Group (G184)$$ where the two groups overlap (Central Appalachians), but that group generally features calciphilic species that are absent or unimportant in this G183.

Missouri has a "glacial fen" type that covers northern Missouri and belongs within ~Midwest Prairie Alkaline Fen Group (G183)$$ (Nelson 2005). Missouri's "prairie fen" is entirely restricted to the Ozarks and belongs within ~Central Interior Seepage Fen Group (G182)$$. Extension of G182 into southern Ohio may need to be confirmed.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M876 | North American Boreal & Subboreal Bog & Acidic Fen |  |
| M877 | North American Boreal & Subboreal Alkaline Fen |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This vegetation is typically dominated by a combination of shrubs and herbs, with a well-developed herbaceous layer dominated by hydrophytic graminoid, sedge, and forb species, often with a sparse to somewhat dense cover of shrubs interspersed in the stand, or present on the edges. Some associations contain substantial *Sphagnum* mosses. Trees are usually uncommon in these wetlands, although *Acer rubrum* or other native increasers may invade some examples. This vegetation may be zoned or it may be a complex of zones or patches with a mixture of physiognomies. The wettest areas typically have herbaceous graminoid vegetation dominated by *Carex* spp., usually with abundant *Sphagnum*. Scattered trees and shrubs may be present in the herbaceous zones. Most examples also have a dense shrub zone around the edges. Some examples have adjacent forested zones around the edges, or the openings may be embedded in a forest matrix. Some examples, particularly seepage wetlands, may be in a mosaic wetland with less calcareous parts away from the seepage areas.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The vegetation of ~Central Interior Seepage Fen Group (G182)$$ is typically dominated by calciphilic *Carex* spp. and graminoids such as *Andropogon gerardii*. Other characteristic species include *Cardamine bulbosa, Impatiens capensis, Osmunda* spp., *Parnassia grandifolia, Rudbeckia fulgida var. umbrosa, Rudbeckia fulgida var. umbrosa, Sorghastrum nutans, Spartina pectinata, Scirpus atrovirens, Scirpus cyperinus*, and *Thelypteris palustris var. pubescens*. Tall shrubs such as *Alnus serrulata, Cornus amomum* and *Salix* spp., may occur, and *Acer rubrum* can invade examples.

Characteristic shrubs in stands of ~Central & Southern Appalachian Seep Group (G184)$$ include *Alnus serrulata, Toxicodendron vernix*, and *Viburnum nudum var. cassinoides*. Some other shrubs that may be present include *Chamaedaphne calyculata, Cornus racemosa, Ilex collina, Kalmia carolina, Lindera benzoin, Rhododendron arborescens, Rhododendron catawbiense, Rhododendron viscosum, Salix sericea, Sanguisorba canadensis, Spiraea alba var. latifolia*, and *Vaccinium macrocarpon*. Some graminoids which are typical include *Calamagrostis canadensis, Carex atlantica, Carex canescens, Carex echinata, Carex folliculata, Carex gynandra, Carex leptalea, Carex lurida, Carex ruthii, Carex stricta, Carex scoparia, Carex trisperma, Cladium mariscoides, Eriophorum virginicum, Juncus gymnocarpus, Rhynchospora alba, Rhynchospora rariflora*, and *Scirpus cyperinus*. Some forbs and ferns include *Caltha palustris, Chelone cuthbertii, Drosera rotundifolia, Helenium brevifolium, Lilium grayi, Osmunda cinnamomea, Oxypolis rigidior, Parnassia asarifolia, Parnassia grandifolia, Platanthera clavellata, Sarracenia rubra ssp. jonesii, Sarracenia oreophila, Scutellaria lateriflora, Solidago patula var. patula, Solidago uliginosa, Symphyotrichum puniceum, Thelypteris noveboracensis*, and *Woodwardia areolata*. Mosses include *Polytrichum* spp., *Sphagnum bartlettianum, Sphagnum subsecundum, Sphagnum warnstorfii*, and other *Sphagnum* spp.

The vegetation of ~North-Central & Northeastern Seep Group (G189)$$ is typically dominated by tall and short wetland forbs or by graminoids. Species characteristic of floodplains and true bogs are typically absent, but some bog-related species may be present. Shrub species are typically sparse or form dense zones around the edges. The shrubs are most typically mesophytic, rather than obligate wetland species. The herb layer is generally well-developed, and is usually dominated either by characteristic forbs such as *Chelone* spp., *Impatiens capensis, Impatiens pallida, Rudbeckia laciniata*, or *Symplocarpus foetidus*, or by *Carex* spp. and other graminoids such as *Eriophorum virginicum* and *Glyceria striata*. Trees may be present on the edges of stands and often overhanging, but are not characteristic.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: In the Central and Southern Appalachians (G184), the natural dynamics of this vegetation are not fully understood and are subject to debate. The factors that created and naturally maintain the vegetation are not completely clear. Most examples show a strong tendency at present for shrubs and trees to increase in density in the open areas, threatening to eliminate the characteristic herbaceous and graminoid species. This suggests that an important process has been altered or lost. One hypothesis is that these wetlands are an ephemeral feature developing from abandoned beaver ponds. Another hypothesis is that they result from a narrow combination of moisture and nutrient conditions, which have been widely altered in an obscure way that has changed ecosystem stability. The cattle grazing that was nearly universal in examples of this group in the past appears to have delayed woody succession but may also have altered the natural characteristics, including through nutrient enhancement. Fire is sometimes considered a factor, but most examples do not appear flammable enough to burn. Besides woody encroachment, they may be altered by changes in adjacent drainage, such as entrenchment by streams.

The presence of seepage is the primary environmental characteristic of north-central and northeastern seeps (G189). Long-term droughts that would affect seepage flow are presumed to have an effect, but this has not been documented. Soil wetness may limit recruitment of most tree and shrub seedlings to drier microsites, making canopy gaps persist longer than in adjacent forests and creating and sustaining the openings where this vegetation is found. Fire may penetrate from adjacent forests, but only in the driest conditions are they likely to be intense enough to have much effect within. Seeps are fairly permanent features of the landscape, but may potentially be created, destroyed, or changed in extent because of changes in groundwater flow, stream entrenchment or headward erosion, mass movement on slopes, or long-term climatic cycles. Examples are often left undisturbed when surrounding forests are logged. Effects of logging on water infiltration or surface flow may have significant indirect effects.

ENVIRONMENT

Environmental Description: Habitats are generally on flat to gently sloping terrain, on a variety of rock types including mafic and ultramafic igneous and metamorphic as well as calcareous and (less frequently) acidic sedimentary. Some soils are essentially a thin organic layer over limestone gravel, over a less permeable layer of more solid rock; the soil or substrate is saturated by groundwater, which is circumneutral and of calcareous origin in some examples and acidic in others. To the north, the organic (peat) surface component of the substrate may be deeper than in the south. In the Central and Southern Appalachians, these sites occur at elevations below 1220 m (4000 feet) on soils which are often saturated and mucky, including in poorly drained bottomlands. Wetness results from a combination of groundwater input, seepage from adjacent slopes, rainfall and impeded drainage. In glaciated areas, examples are characteristically in pitted outwash or in kettle lakes associated with kettle-kame-moraine topography. North-central and northeastern seeps are linear, non-peaty, non-extensive sphagnous, often rocky, groundwater slope wetlands that are embedded in an upland forest setting. Landforms include sideslopes of hills in narrow valleys, edges of flat valley bottoms, bases of bluffs, rock ledges, and terraces, as well as concave slopes, convex slopes, and (rarely) ridgetop gaps.

The soil of the Southern and Central Appalachian examples (G184) is saturated most or all of the year, at least in the wettest parts, and may be very mucky. Although sites rarely flood, wetness results from a combination of groundwater input, rainfall, seepage from adjacent slopes, and impeded drainage. The groundwater is usually highly acidic and low in dissolved bases, but one or a few examples have somewhat calcareous water input because groundwater flows through mafic rock substrates. Overland flow and stream flooding are presumably only rare events. The geologic substrate is usually alluvium. The amount of seepage water input is variable among examples. In a hydrogeomorphic sense, the Southern and Central Appalachian examples would be regarded as being primarily a slope type (NRCS 2008), although typically on very gentle slopes.

*Climate:* This vegetation is favored by a cool-temperate climate, where cool temperatures and high rainfall make more water available, making seepage flow more reliable. *Soil/substrate/hydrology:* This vegetation occurs in small patches where seepage creates permanent or seasonal saturated soil conditions. Soils are usually saturated mineral soils, rather than peats or mucks. Soil wetness may limit recruitment of most tree and shrub seedlings to drier microsites, making canopy gaps persist longer than in adjacent forests and creating and sustaining the openings where this vegetation is found. Wetness may vary substantially over short distances in response to amounts of seepage, flow, and pooling by topography or impermeable substrate.

DISTRIBUTION

\*Geographic Range: These seepage wetlands range from the Southern Appalachians, Cumberland Mountains, upper Piedmont, Ridge and Valley, Central Appalachians, Interior Low Plateau, and Ozark regions north to New England, the Great Lakes states, and west to Minnesota, as well as into adjacent Canada.

Nations: CA, US

States/Provinces: AR, CT, DC, DE, GA, IA, IL, IN, KY, MA, MD, ME, MI, MN, MO, NB?, NC, NH, NJ, NY, OH, ON, PA, QC?, RI, SC, TN, VA, VT, WI, WV

USFS Ecoregions (2007) [optional]: 221A:CC, 221Ba:CCC, 221E:CC, 221F:CC, 222H:CC, 222Ja:CCC, 222Jb:CCC, 222Jc:CCC, 222Je:CCC, 222Jf:CCP, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222K:CC, 222M:CC, 222U:CP, 251B:CC, M221A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G184 | Central & Southern Appalachian Seep |
| G182 | Central Interior Seepage Fen |
| G189 | North-Central & Northeastern Seep |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Mountain Bog | Richardson and Gibbons 1993 |  |
| < | Mountain Bogs and Fens | Richardson and Gibbons 1993 |  |
| > | Mountain and Piedmont Bog | Wharton 1978 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M. Pyne and S. Menard, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne, S. Menard, S.C. Gawler, D. Faber-Langendoen

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by S.C. Gawler, A.S. Weakley, and M.P. Schafale

Version Date: 15 Oct 2014

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\*References [Required if used in text]:

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2. Shrub & Herb Vegetation

2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

M069. Eastern North American Marsh, Wet Meadow & Shrubland

Type Concept Sentence: This largely freshwater wetland macrogroup encompasses shrub swamps, marshes, wet meadows and wet prairies of temperate and boreal eastern North America, north of the southern Atlantic and Gulf coastal plains and east of the Great Plains and Yukon Territory. It is dominated by graminoids (e.g., species of the genera *Calamagrostis, Carex, Echinochloa, Glyceria, Juncus, Leersia, Schoenoplectus, Scirpus, Sparganium, Typha, Zizania*), forbs (e.g., species of the genera *Bidens, Eupatorium, Lobelia, Polygonum, Rumex, Sagittaria*), and shrubs (e.g., *Alnus incana, Alnus serrulata, Cornus sericea*, other *Cornus* spp., *Salix* spp., *Spiraea* spp., *Viburnum* spp.) in a widely variable composition and structure. This macrogroup also contains eastern inland saline meadows characterized by *Atriplex patula, Juncus gerardii*, and others.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (D323)

Elcode: M069

\*Scientific Name: *Typha latifolia - Ageratina altissima - Juncus* spp. Marsh, Wet Meadow & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Broadleaf Cattail - White Snakeroot - Rush species Marsh, Wet Meadow & Shrubland Macrogroup

\*Colloquial Name: Eastern North American Marsh, Wet Meadow & Shrubland

\*Type Concept: This largely freshwater wetland macrogroup encompasses shrub swamps, marshes, wet meadows and wet prairies of temperate and boreal eastern North America, north of the southern Atlantic and Gulf coastal plains and east of the Great Plains and Yukon Territory. It is dominated by graminoids (e.g., species of the genera *Calamagrostis, Carex, Echinochloa, Glyceria, Juncus, Leersia, Schoenoplectus, Scirpus, Sparganium, Typha, Zizania)*, forbs (e.g., species of the genera *Bidens, Eupatorium, Lobelia, Polygonum, Rumex, Sagittaria*), and shrubs (e.g., species of *Alnus, Cornus, Salix, Spiraea, Viburnum*) in a widely variable composition and structure. This macrogroup also contains eastern inland saline meadows characterized by *Atriplex patula, Juncus gerardii*, and others. Freshwater marshes and shrub swamps occur in closed or open basins that are generally flat and shallow and are frequently to nearly always flooded. Water depths during high water periods range from a few centimeters to approximately 1 m. Stands assigned to this macrogroup are associated with lakes, ponds, slow-moving streams, non-forested seepages, and/or impoundments or ditches on mineral soils with or without a well-decomposed muck layer. This vegetation spans a wide range, from southeastern and south-central Canada southwest to the Great Lakes states and provinces, south to the Ozarks in Arkansas and east through the northern regions of the Gulf coast states to the southern Appalachian Mountains in Tennessee. It includes the Appalachian Mountain, Piedmont, and Interior Plateau regions, but not the Atlantic or Gulf coastal plains.

\*Diagnostic Characteristics: Saturated or seasonally flooded to semipermanently flooded freshwater emergent marshes, seepage wet meadows, or shrub swamps characterized by wetland herbs, e.g., species of the genera *Calamagrostis, Carex, Echinochloa, Glyceria, Juncus, Leersia, Schoenoplectus, Scirpus, Sparganium, Typha, Zizania*), forbs (e.g., species of the genera *Bidens, Eupatorium, Lobelia, Polygonum, Rumex, Sagittaria*), and wetland shrubs such as *Alnus incana, Alnus serrulata, Cornus sericea*, other *Cornus* spp., and *Salix* spp. The substrate is mineral soil or deep muck, but not peat.

\*Classification Comments: This unit is geographically and hydrologically rather broad, and, ultimately, some subdivision may be warranted. Also ~Atlantic & Gulf Coastal Plain Wet Prairie & Marsh Macrogroup (M067)$$ overlaps a great deal and is confusing because it is coastal, mostly, and this macrogroup (M069) is mostly non-coastal except for ~Northern & Mid-Atlantic Coastal Wetland Group (G752)$$. The distinction between these two needs to be made very clear.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M303 | Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland | monodominant stands of invasives, such as *Phragmites australis* or *Typha angustifolia* are present in some sites. Where they are mixed with natives they can be treated with M069. |
| M071 | Great Plains Marsh, Wet Meadow, Shrubland & Playa | has substantial overlap in species composition but vegetation of the Great Plains can be differentiated by marsh and wet meadow species that do not occur or are rare in the East, such as *Beckmannia syzigachne, Calamagrostis stricta, Carex nebrascensis, Pascopyrum smithii, Scolochloa festucacea, Sporobolus airoides*, and others. |
| M066 | Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh |  |
| M067 | Atlantic & Gulf Coastal Plain Wet Prairie & Marsh | overlaps a great deal and is confusing because it is coastal, mostly, and M069 is mostly non-coastal except G752. |
| M108 | Eastern North American Freshwater Aquatic Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Physiognomy is widely variable among and often within sites, ranging from dense shrub swamp, to herbaceous wetland with varying but generally small amounts of shrub or tree sapling cover. Evergreens are generally absent or unimportant.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: These freshwater marshes and shrub swamps are characterized by a high diversity of species. *Typha* spp. and *Schoenoplectus* spp. are common and widespread, but a wide variety may be dominant in any single stand. Dominant shrubs include *Alnus incana ssp. rugosa* or *Alnus serrulata, Cephalanthus occidentalis, Cornus* spp., or *Vaccinium corymbosum*. Associates include *Ilex verticillata, Myrica gale, Spiraea alba, Salix* spp., and *Viburnum nudum var. cassinoides*. Many other graminoids or broad-leaved forbs can be found in these wetlands. Some of the common ones are *Calamagrostis canadensis, Carex aquatilis, Carex lacustris, Carex pellita, Carex stricta, Dulichium arundinaceum, Eleocharis palustris, Juncus* spp., *Leersia oryzoides, Peltandra virginica, Pontederia cordata, Sagittaria latifolia, Schoenoplectus acutus, Schoenoplectus americanus, Bolboschoenus fluviatilis (= Schoenoplectus fluviatilis), Schoenoplectus tabernaemontani, Scirpus atrovirens, Scirpus cyperinus, Sparganium* spp., *Spartina pectinata, Zizania aquatica*, and *Zizania palustris*. Along the drier margins of some sites where soils are more saturated than flooded, *Calla palustris, Symplocarpus foetidus*, and *Thelypteris palustris* can sometimes be found. The invasives *Lythrum salicaria* and *Phragmites australis* are present in some sites.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The dynamics of water levels are the most important factor in this vegetation, differentiating it from both the surrounding uplands and among the various alliances and associations comprising the macrogroup. Variation in rainfall patterns and in site drainage drives variation in duration of flooding. Wave and current action is typically minor, although especially strong storms may create large waves and/or currents that break up marsh vegetation. Prolonged drought or a lowering of the water table may lead to exposure of the soil and invasion by plants less tolerant of prolonged flooding. Fire is presumably naturally rare in this vegetation. Although they would naturally be exposed to fires in the surrounding uplands, standing water and lack of continuous fuel limit fires to the edges, except perhaps in early fall. Presumably important as a dynamic process is the migration of amphibians, which concentrate here for breeding. Ecosystem dynamics may be strongly affected by the suitability of surrounding uplands for amphibian adult habitat.

ENVIRONMENT

Environmental Description: The climate of these wetlands ranges from temperate to boreal in Canada and the northern United States. Hydrology ranges from saturated to seasonally flooded to semipermanently flooded. Stands occur on flat to gently sloping to undulating surfaces, in shallow to deep basins of sinkholes or other isolated depressions on uplands, or associated with water courses, lakes, or ponds. Soils are poorly drained to very poorly drained, and surface water may be present for extended periods of time, rarely becoming dry. The typical hydrology is seasonally flooded, but the hydroperiod may be of greater or lesser length, depending on the depth of the basin or depression feature and the annual rainfall. Water depth may vary greatly on a seasonal basis and may be a meter deep or more in the winter in examples with longer hydroperiods. Some examples become dry in the summer. Most examples are eutrophic with muck over mineral soil as the substrate. Where associated with lakes or ponds, wave or currents are more active, and the mineral soil may be exposed.

DISTRIBUTION

\*Geographic Range: This freshwater marsh macrogroup is found across temperate and boreal eastern North America, north of the southern Atlantic and Gulf coastal plains and east of the Great Plains and Yukon Territory. It stretches from eastern to central boreal Canada, from New England and New Brunswick, excluding the Atlantic Coastal Plain, west through the Great Lakes area to eastern North Dakota and northwestern Ontario, south to Missouri and east to the Southern Blue Ridge and Southern and Central Appalachians.

Nations: CA, US

States/Provinces: AB, AR, CT, DE, IA, IL, IN, KY, MA, MB, MD, ME, MI, MN, MO, NB, ND, NF, NH, NJ, NS, NY, OH, ON, PA, PE, QC, RI, SD, SK, TN, VA, VT, WI, WV

USFS Ecoregions (2007) [optional]: 212Ha:CCC, 212Hb:CCC, 212Hc:CCC, 212Hd:CCC, 212He:CCC, 212Hf:CCC, 212Hg:CCC, 212Hh:CCC, 212Hi:CCC, 212Hj:CCC, 212Hk:CCC, 212Hl:CCC, 212Hm:CCC, 212J:CC, 212Lb:CPP, 212Ra:CCC, 212Rb:CCC, 212Rc:CCC, 212Rd:CCC, 212Re:CCC, 212Sc:CCC, 212Sn:CCC, 212Sq:CCC, 212Te:CCC, 212Tf:CCC, 212Y:CC, 212Z:CC, 222Ja:CCC, 222Jb:CCC, 222Jc:CCC, 222Je:CCC, 222Jg:CCC, 222Jh:CCC, 222Ji:CCC, 222Ua:CCC, 222Ud:CCC, 222Ue:CCC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G125 | Eastern North American Freshwater Marsh |
| G167 | Eastern North American Shrub Swamp |
| G599 | Central Interior-Appalachian Open Depression Pond |
| G770 | Midwest Wet Prairie & Wet Meadow |
| G771 | Laurentian-Northeastern Wet Meadow |
| G773 | Eastern North American Inland Saline Marsh |
| G803 | Southeastern Granite Outcrop Pool |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-07-16 | M160 Northern & Central Tall Shrub Wetland Macrogroup | M160 merged into M069 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Atlantic Freshwater Marshes | National Wetlands Working Group 1988 |  |
| < | Eastern Temperate Marsh | National Wetlands Working Group 1988 |  |
| < | Emergent Aquatics | Curtis 1959 | Does not include the Great Lakes shore marshes in Wisconsin. |
| > | Freshwater Marsh | Mitsch and Gosselink 2000 |  |
| >< | Freshwater wetland | Golet and Larson 1974 |  |
| > | Scrub-Shrub Wetland: Broad-lead Deciduous subclass | Cowardin et al. 1979 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.T. Curtis (1959); F.C. Golet (1973)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: J. Drake, S.C. Gawler, L. Sneddon

Acknowledgments [optional]:

Version Date: 11 Jan 2016

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\*References [Required if used in text]:

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2. Shrub & Herb Vegetation

2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

M881. Eastern North American Riverscour Vegetation

Type Concept Sentence: This macrogroup comprises vegetation that is highly variable in composition and structure, occurring in the eastern U.S. and adjacent Canada on the shores of rivers that are impacted by sediment removal and redeposition as a result of seasonal flood-scour and swift currents.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (D323)

Elcode: M881

\*Scientific Name: Eastern North American Riverscour Vegetation Macrogroup

\*Common (Translated Scientific) Name: Eastern North American Riverscour Vegetation Macrogroup

\*Colloquial Name: Eastern North American Riverscour Vegetation

\*Type Concept: This widely ranging macrogroup comprises a large number of highly variable vegetation types that occur on the shores of rivers in the eastern U.S. and adjacent Canada. Characteristic species vary over the range. Shrubs may include *Alnus serrulata, Hypericum prolificum, Prunus pumila, Salix caroliniana*, or *Salix interior*. Characteristic herbaceous species, depending on geography, may include *Andropogon gerardii, Baptisia australis, Calamagrostis canadensis, Campanula rotundifolia, Carex torta, Deschampsia cespitosa, Doellingeria umbellata, Elymus* spp., *Eupatorium* spp., *Packera paupercula, Panicum virgatum, Schizachyrium scoparium, Solidago gigantea, Solidago simplex, Spartina pectinata*, and *Triantha glutinosa*. The patchy vegetation ranges from riverside prairies to highly flood-scoured, ice-scoured, and flood-battered patchy or very sparse vegetation along high-gradient rivers.

\*Diagnostic Characteristics: This macrogroup can be recognized by its association with high-gradient swift river currents, its dynamic physiognomic and floristic composition, and the presence of species adapted to both hydric and xeric environments. These include combinations of *Andropogon gerardii, Campanula rotundifolia, Carex torta, Panicum virgatum, Prunus pumila, Schizachyrium scoparium, Solidago simplex, Spartina pectinata*, and several species of *Salix*. Substrate is usually alluvium, sand, silt, cobble, or bedrock exposures.

\*Classification Comments: This macrogroup was split from former Eastern North American Lake & River Shoreline Vegetation Macrogroup (M176) to differentiate riverscour vegetation from that of gentle river currents and lakeshores.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M880 | Eastern North American Wet Shoreline Vegetation | occurs on shores of lakes and slow-moving rivers with greater organic accumulation, as well as presence of marshes and shrublands. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is characterized by highly variable physiognomy, both among and within sites. Vegetation is usually flood-battered, with bent or broken stems, and with flood-deposited debris. Scattered short saplings of typical floodplain trees and shrubs may be evident. Patchy prairies dominated by forbs and grasses often form, but vegetation can be very sparse or absent following extreme flooding events.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Characteristic species vary over the range. Shrubs may include *Alnus serrulata, Hypericum prolificum, Prunus pumila, Salix caroliniana*, or *Salix interior*. Characteristic herbaceous species, depending on geography, may include *Andropogon gerardii, Baptisia australis, Calamagrostis canadensis, Campanula rotundifolia, Carex torta, Deschampsia cespitosa, Doellingeria umbellata, Elymus* spp., *Eupatorium* spp., *Packera paupercula, Panicum virgatum, Schizachyrium scoparium, Solidago gigantea, Solidago simplex, Spartina pectinata*, and *Triantha glutinosa*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: The patchy vegetation ranges from riverside prairies to highly flood-scoured, ice-scoured, and flood-battered patchy or very sparse vegetation along high-gradient rivers. Sites on the shores of these rivers are impacted by sediment removal and redeposition as a result of seasonal flood-scour and swift currents.

DISTRIBUTION

\*Geographic Range:

Nations: CA, US

States/Provinces: CT?, MA, ME, MI, MN, NB, NH, NS, NY, PA?, RI, VT, WI, WV

USFS Ecoregions (2007) [optional]: 211A:CP, 211B:CP, 211C:CP, 211D:CP, 211F:CC, 212Tb:CCC, 221:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G753 | Central Interior-Appalachian Riverscour Barrens & Prairie |
| G754 | Northeastern Riverscour Barrens & Prairie |
| G792 | Laurentian-Acadian Riverscour Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-05-05 | M165 Eastern North American Riverscour Wetland Macrogroup | M165 merged with M176 (DFL 7-12); subsequently M176 split into M880 & M881 |
| 2014-05-05 | M176 Eastern North American Wet Shoreline Vegetation Macrogroup | M176 split into M880 & M881 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Riverbed - Bank - Floodplain Complex | Fike 1999 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: T. Rawinski, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: L. Sneddon

Acknowledgments [optional]:

Version Date: 15 Oct 2014

REFERENCES

\*References [Required if used in text]:

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2. Shrub & Herb Vegetation

2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

M071. Great Plains Marsh, Wet Meadow, Shrubland & Playa

Type Concept Sentence: This wetland macrogroup is found throughout the Great Plains in riparian and non-riparian settings, dominated by a wide variety of herb or shrub obligate or facultative wetland species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Nd. Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland (D323)

Elcode: M071

\*Scientific Name: *Spartina pectinata* - *Typha* spp. - *Schoenoplectus* spp. Great Plains Marsh, Wet Meadow, Shrubland & Playa Macrogroup

\*Common (Translated Scientific) Name: Prairie Cordgrass - Cattail species - Bulrush species Great Plains Marsh, Wet Meadow, Shrubland & Playa Macrogroup

\*Colloquial Name: Great Plains Marsh, Wet Meadow, Shrubland & Playa

\*Type Concept: This herbaceous- or shrub-dominated wetland is found throughout the Great Plains. Sites can be dominated by emergent wetland-obligate species or by herbaceous or shrub species tolerant of seasonal flooding in riparian and non-riparian settings. Abundant species vary widely in this wide-ranging and environmentally diverse macrogroup. Common species in wetter sites include *Sagittaria* spp. *Schoenoplectus* spp., *Sparganium* spp., and *Typha* spp. In wet meadows and wet prairies, *Calamagrostis canadensis, Calamagrostis stricta, Carex* spp. (including *Carex atherodes, Carex pellita, Carex nebrascensis*), *Eleocharis palustris, Glyceria* spp., *Juncus* spp., *Lycopus americanus, Panicum virgatum, Spartina pectinata*, and *Triglochin maritima* are common. *Pascopyrum smithii* often occurs on the drier edges of stands in the western parts of its range and in temporarily flooded basins in the southern Great Plains along with *Panicum obtusum* and *Bouteloua dactyloides*. In more saline areas, common species can include *Carex sartwellii, Carex praegracilis, Hordeum jubatum, Plantago eriopoda*, and *Schoenoplectus pungens*. Shrubs are less common range-wide but dominate some sites. Typical species are *Amorpha fruticosa, Artemisia cana ssp. cana* and *Artemisia tridentata* (in the northwest portion of the range), *Cornus drummondii, Cornus sericea, Prunus virginiana, Salix* spp. (especially *Salix interior*), *Symphoricarpos occidentalis*, and the exotic *Elaeagnus angustifolia*. Seedlings of riparian trees, especially *Populus deltoides*, can be found in some stands. This macrogroup occurs in basins and along rivers and streams throughout the semi-arid to dry-temperate Great Plains. The hydrologic regime varies from sites flooded for only a few weeks each growing season to those flooded for years at a time. The water source for these sites can be snowmelt (either local or from the Rocky Mountains), rain, or groundwater. Sites with limited watersheds and little or no groundwater connection tend to be wet for short periods of time, while those with larger watersheds or more reliable water sources can be saturated or flooded for most or all of the growing season. Water varies from fresh to moderately saline. Many sites are on fine-textured, poorly drained soils either on the surface or forming an impermeable subsurface layer that prevents rapid water drainage. Some sites have coarse, often alluvial soils. Soils are nearly always mineral, but muck can accumulate on some sites, and this macrogroup includes fens where marl or peat can form.

\*Diagnostic Characteristics: This macrogroup has a range of hydrologic regimes in both riparian and non-riparian settings, but all sites are flooded for at least a few weeks during the growing season. Sites are dominated by herbaceous or shrub species that are tolerant of this inundation or are annual species that germinate after sites dry. These wetlands occur in a largely prairie landscape.

\*Classification Comments: Criteria for separating this macrogroup (M071) from ~Eastern North American Marsh, Wet Meadow & Shrubland Macrogroup (M069)$$ need to be better defined.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M073 | Vancouverian Lowland Marsh, Wet Meadow & Shrubland |  |
| M069 | Eastern North American Marsh, Wet Meadow & Shrubland | has substantial overlap in species composition but vegetation of the Great Plains can be differentiated by marsh and wet meadow species that do not occur or are rare in the East, such as *Beckmannia syzigachne, Calamagrostis stricta, Carex nebrascensis, Pascopyrum smithii, Scolochloa festucacea, Sporobolus airoides*, and others. |
| M303 | Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland |  |
| M067 | Atlantic & Gulf Coastal Plain Wet Prairie & Marsh |  |
| M077 | Great Plains Saline Wet Meadow & Marsh | less-saline stands can be similar but species such as *Hordeum jubatum* and *Distichlis spicata* are more common in this macrogroup. |
| M108 | Eastern North American Freshwater Aquatic Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Most examples of this macrogroup are dominated by perennial herbaceous species. This includes emergent species up to 2 m tall in shallower, semipermanently flooded wetlands, and graminoids and forbs in seasonally flooded or saturated sites. Shrubs 1-3 m tall are present in some examples and can be dominant, particularly in riparian settings.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Abundant species vary widely in this wide-ranging and environmentally diverse macrogroup. Common species in wetter sites include *Sagittaria* spp., *Schoenoplectus acutus, Schoenoplectus americanus, Bolboschoenus fluviatilis (= Schoenoplectus fluviatilis), Bolboschoenus maritimus (= Schoenoplectus maritimus), Schoenoplectus tabernaemontani, Sparganium* spp., *Typha angustifolia, Typha domingensis* (in the south), and *Typha latifolia*. In wet meadows and wet prairies, *Calamagrostis canadensis, Calamagrostis stricta, Carex* spp. (including *Carex atherodes, Carex pellita, Carex nebrascensis*), *Glyceria* spp., *Eleocharis palustris, Juncus* spp., *Lycopus americanus, Panicum virgatum, Spartina pectinata*, and *Triglochin maritima* are common. *Pascopyrum smithii* often occurs on the drier edges of stands in the western parts of its range and in temporarily flooded basins in the southern Great Plains along with *Panicum obtusum* and *Bouteloua dactyloides (= Buchloe dactyloides)*. Fens contain species rarely found elsewhere in this macrogroup. These include *Carex prairea, Dulichium arundinaceum, Lobelia kalmii, Onoclea sensibilis*, and *Rhynchospora capillacea*. In more saline areas, common species can include *Carex sartwellii, Carex praegracilis, Hordeum jubatum, Plantago eriopoda*, and *Schoenoplectus pungens*. Shrubs are less common range-wide but dominate some sites. Typical species are *Amorpha fruticosa, Artemisia cana ssp. cana* and *Artemisia tridentata* (in the northwest portion of the range), *Cornus drummondii, Cornus sericea, Prunus virginiana, Salix* spp. (especially *Salix interior*), and *Symphoricarpos occidentalis*, and the exotic *Elaeagnus angustifolia*. Seedlings of riparian trees, especially *Populus deltoides*, can be found in some stands.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
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Dynamics: These wetlands occur in a semi-arid to dry-temperate climate and so are very susceptible to seasonal and inter-annual changes in precipitation within their watersheds. With the high evaporation rates in the climatic zone, reductions in water input (through reduced rain, snowmelt, or groundwater discharge) are quickly translated to reductions in water levels. Many examples of this macrogroup are shaped by seasonal or temporary fluctuations in available water with plants able to take advantage of the higher water in the spring or after heavy rains and then tolerant of the relatively drier conditions between flooding events. Other sites have more consistent sources of water and have species that require near permanent flooding or saturation to flourish, but even these sites can be affected by inter-annual changes in precipitation levels. Many wetlands in the Great Plains change greatly in size and composition over a period of several years as precipitation levels rise and fall. Changes in water depth of over a meter are possible over several years (Stewart and Kantrud 1971). These multi-year changes promote floristic diversity by creating shifting environments and vegetation at any one place on the landscape. During the wetter seasonal or multi-year periods, temporary connections may be formed between otherwise discontinuous wetlands, allowing the spread of species and possibly affecting water chemistry through flushing of salts or other dissolved chemicals into or out of basins (Leibowitz and Vining 2003). Fire in adjacent uplands can spread into drier examples of this macrogroup, removing litter and reducing dense vegetation.

ENVIRONMENT

Environmental Description: This macrogroup occurs in basins and along rivers and streams throughout the semi-arid to dry-temperate Great Plains. The hydrologic regime varies from sites flooded for only a few weeks each growing season to those under water for years at a time. Water depth rarely exceeds 1 m for extended periods. The water source for these sites can be snowmelt (either local or from the Rocky Mountains), rain, or groundwater. Sites with limited watersheds and little or no groundwater connection tend to be wet for short periods of time while those with larger watersheds or more reliable water sources can be saturated or flooded for most or all of the growing season. Water varies from fresh to moderately saline. Many sites are on fine-textured, poorly drained soils either on the surface or forming an impermeable subsurface layer that prevents rapid water drainage. Some sites have coarse, often alluvial soils. Soils are nearly always mineral, but muck can accumulate on some sites, and this macrogroup includes fens where marl or peat can form.

DISTRIBUTION

\*Geographic Range: This macrogroup is found throughout the Great Plains from the southern Canadian Prairie Provinces to northern Texas and from the High Plains below the Rocky Mountains to the Tallgrass Prairies in the central United States.

Nations: CA, MX?, US

States/Provinces: AB, CO, IA, KS, MB, MN, MO, MT, ND, NE, NM, OK, SD, SK, TX, WY

USFS Ecoregions (2007) [optional]: 251A:CC, 251B:CC, 251C:CC, 251F:CC, 251H:CC, 315D:CC, 315F:CP, 331B:CC, 331C:CC, 331D:CC, 331E:CC, 331F:CC, 331G:CC, 331H:CC, 331J:CC, 331K:CC, 331L:CC, 331M:CC, 331N:CC, 332A:CC, 332B:CC, 332C:CC, 332D:CC, 332E:CC, 332F:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G325 | Great Plains Freshwater Marsh |
| G336 | Great Plains Wet Prairie, Wet Meadow & Seepage Fen |
| G337 | Great Plains Riparian Wet Meadow & Shrubland |
| G568 | Great Plains Riverscour Vegetation |
| G136 | Great Plains Playa & Rainwater Basin Wetland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Prairie Potholes | Richardson 2000 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: J. Drake

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland

D322. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland

Type Concept Sentence: The marshes are discontinuous along the Atlantic and Gulf coasts of the United States and adjacent Canada from Newfoundland to Texas. They include fresh and oligohaline tidal marshes, as well as non-tidal shrub and herb wetlands found in coastal plain depressions and basins, seepage slopes, interdunal swales and poorly drained wet flats.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.4.Ne. Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland (F013)

Elcode: D322

\*Scientific Name: *Zizania aquatica - Spartina patens - Rhynchospora* spp. Freshwater Marsh, Wet Meadow & Shrubland Division

\*Common (Translated Scientific) Name: Annual Wild Rice - Saltmeadow Cordgrass - Beaksedge species Freshwater Marsh, Wet Meadow & Shrubland Division

\*Colloquial Name: Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland

\*Type Concept: The fresh and oligohaline tidal marshes constitute the primary vegetation between outer tidal salt and brackish marshes and inland non-tidally influenced vegetation (upland or wetland). Examples are found from Newfoundland to Texas along the Atlantic and Gulf coasts of the United States and adjacent Canada. They may grade into uplands or non-tidal freshwater marshes and swamps. Most examples of this vegetation are characterized by a mixture of annual and perennial grasses, forbs, sedges, rushes, other grass-like plants, floating or submerged aquatics, shrubs, and scattered tree saplings. Dominance patterns change seasonally, yearly, and geographically. In addition to regional variability, freshwater tidal marshes may also exhibit floristic zonation based on age, water depth, tidal regime, and other factors, into a low and high marsh. This vegetation supports broad-leaved emergent plants such as *Nuphar advena, Nuphar orbiculata, Nuphar sagittifolia, Peltandra virginica, Pontederia cordata*, and *Sagittaria* spp.; annual and perennial grasses such as *Calamagrostis canadensis, Leersia oryzoides, Panicum hemitomon, Spartina cynosuroides, Spartina patens, Zizania aquatica, Zizaniopsis miliacea*; sedges and rushes such as *Carex* spp., *Cladium mariscus ssp. jamaicense, Eleocharis* spp., *Fuirena* spp., *Schoenoplectus pungens, Schoenoplectus tabernaemontani*; other grass-like plants and annual and perennial forbs such as *Acorus calamus, Amaranthus cannabinus, Ambrosia trifida, Bidens* spp., *Impatiens capensis, Hibiscus moscheutos, Kosteletzkya virginica, Polygonum* spp., *Sium suave, Typha* spp.; and scattered shrubs such as *Cephalanthus occidentalis* and *Morella cerifera*.

Common taxa of the non-tidal marshes and wet prairies include species of *Eleocharis, Fimbristylis, Panicum, Rhynchospora, Sarracenia*, and *Xyris*. Also included are warm-temperate shrub swamps dominated by the shrubs *Cephalanthus occidentalis, Vaccinium corymbosum, Vaccinium formosum*, or *Vaccinium fuscatum*. These wetlands occur on the Atlantic and Gulf coastal plains in depressions and basins, seepage slopes, interdunal swales and poorly drained wet flats. The vegetation ranges from floating-leaved aquatics in deeper basins, to emergent marsh in semipermanent water, to drawdown zones with diverse small graminoid and forb vegetation, to shrub swamp and shrub edges. Wet prairie vegetation is also found on extensive wet flats and consists of primarily herbaceous wetland vegetation with relatively thick cover of graminoid species. Examples occupy low, flat plains on poorly drained soils, often saturated for 50-100 days per year. In addition to saturation or flooding, occasional to frequent fires, including during the early growing season, promote the maintenance of this vegetation.

\*Diagnostic Characteristics: Among the hundreds of species found in Atlantic and Gulf Coast freshwater tidal marshes (Tinder 2013), there appear to be few that are unique to this type, apart from *Aeschynomene virginica*, which is a federally threatened plant species (Odum et al. 1984). Tidal and non-tidal freshwater habitats share many species. Rather than the presence of specific freshwater species, this vegetation might better be differentiated by a mixture of wetland plants that are also tolerant of low salinity levels, including annual and perennial grasses, forbs, sedges, rushes, other grass-like plants, floating or submerged aquatics, shrubs, and scattered tree saplings. Dominance patterns change seasonally, yearly, and geographically. In addition to regional variability, freshwater tidal marshes may also exhibit floristic zonation based on age, water depth, tidal regime, and other factors, into a low and high marsh. Some species that occur in and may dominate or codominate various examples of this vegetation across its range include *Bidens* spp., *Cladium mariscus ssp. jamaicense, Eleocharis* spp., *Hydrocotyle* spp., *Panicum hemitomon, Peltandra virginica, Polygonum* spp., *Pontederia cordata, Sagittaria* spp., *Schoenoplectus pungens, Schoenoplectus tabernaemontani*, and *Spartina cynosuroides, Spartina patens, Zizania aquatica*, and *Zizaniopsis miliacea*.

Atlantic and Gulf coastal non-tidal freshwater marshes are found in depressions, basins, and interdunal swales, and on seepage slopes, or on wet flats on the coastal plain of the southeastern United States, including some areas as far north as Cape Cod, Massachusetts. Common taxa include species of graminoids *Aristida, Eleocharis, Panicum, Rhynchospora, Xyris*, forbs *Pontederia cordata* and *Sarracenia*, and shrubs *Hypericum, Vaccinium, Ilex*, and *Cephalanthus occidentalis*.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D029 | North American Bog & Fen |  |
| D324 | Atlantic & Gulf Coastal Plain Pocosin |  |
| D262 | Caribbean-Mesoamerican Freshwater Marsh, Wet Meadow & Shrubland |  |
| D031 | Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland |  |
| D323 | Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland |  |
| D033 | North American Great Plains Saline Marsh |  |
| D034 | North American Atlantic & Gulf Coastal Salt Marsh |  |
| D049 | North American Freshwater Aquatic Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The tidal freshwater wetlands are typically characterized by a mixture of annual and perennial grasses, forbs, sedges, rushes, other grass-like plants, floating or submerged aquatics, and more rarely, shrubs, and scattered tree saplings (Tiner 2013). The importance of annuals in this vegetation can lead to high variability in yearly and seasonal dominance patterns. In some high marsh occurrences, annual forbs begin to grow early in the season and appear to dominate, but a little latter perennials overtop them, only to be overtopped themselves by emergent annuals later in the season (Leck et al. 2009).

The non-tidal wetlands are generally dominated by graminoid vegetation. There often are some woody plants, such as low shrubs and/or scattered tall shrubs or very sparse trees present. The tall shrubs have more cover on sites that have not been recently burned. Included here are southern shrublands dominated by *Cephalanthus occidentalis* or *Vaccinium* spp.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: There are no plant species unique to freshwater tidal habitats (Odum et al. 1984), and the list of possible components numbers in the hundreds (Tiner 2013). Most examples of this vegetation are characterized by a mixture of annual and perennial grasses, forbs, sedges, rushes, other grass-like plants, floating or submerged aquatics, shrubs, and scattered tree saplings (Tiner 2013). Dominance patterns change seasonally, yearly, and geographically. In addition to regional variability, freshwater tidal marshes may also exhibit floristic zonation based on age, water depth, tidal regime, and other factors, into a low and high marsh (Odum et al. 1984, Mitsch and Gosselink 1986c, Tiner 2013). Zonation in freshwater tidal marshes is not as pronounced as in salt marshes (Odum et al. 1984, Mitsch and Gosselink 1986c, Tiner 2013), and may often be more of a spatial mosaic driven by a diverse seed bank (Leck and Simpson 1987). Where present, low marsh is younger, more erodible, more deeply flooded for longer periods of time, has lower litter accumulation, lower organic matter in the soils, and lower primary productivity than high marsh (Odum et al. 1984, Mitsch and Gosselink 1986c, Tiner 2013).

The low tidal freshwater marsh is typically characterized by species such as *Amaranthus cannabinus, Heteranthera reniformis, Nuphar advena, Nuphar orbiculata, Nuphar sagittifolia, Peltandra virginica, Pontederia cordata, Sagittaria* spp., *Schoenoplectus pungens, Schoenoplectus tabernaemontani*, and *Zizania aquatica*. The high marsh is more diverse and often includes a mixture of annual and perennial grasses, forbs, sedges, rushes, other grass-like plants, and shrubs (Odum et al. 1984, Mitsch and Gosselink 1986c). In the mid-Atlantic a high marsh may be dominated by a mixed group of annuals in mid-season (e.g., *Acorus calamus, Bidens laevis, Hibiscus moscheutos, Impatiens capensis, Iris versicolor, Polygonum* spp. *Pilea pumila, Amaranthus cannabinus, Symphyotrichum subulatum, Zizania aquatica* and others); later in the season perennial grasses such as *Spartina cynosuroides, Typha* spp., and *Zizaniopsis miliacea* may become monodominant (Odum et al. 1984, Mitsch and Gosselink 1986c, Tiner 2013). Dominants in Louisiana freshwater tidal marshes include *Bidens laevis, Eleocharis* spp., *Hydrocotyle* spp., *Panicum hemitomon, Sagittaria lancifolia, Schoenoplectus pungens, Spartina patens*, and *Zizaniopsis miliacea*. Associates include *Alternanthera philoxeroides* (non-native), *Bacopa monnieri, Cladium mariscus ssp. jamaicense (= Cladium jamaicense), Echinochloa walteri, Leptochloa fusca ssp. fascicularis (= Leptochloa fascicularis), Pluchea camphorata, Pontederia cordata, Sagittaria* spp., *Schoenoplectus californicus*, and *Vigna luteola* (Gosselink et al. 1979, Gosselink 1984, Visser et al. 1998, 2000). Plant composition of freshwater tidal marshes in New Jersey generally occurs as a mosaic of patches dominated by a few or a single species and has dramatic seasonal variation. Tidal freshwater marshes (0-0.5 ppt) are characterized by *Acorus calamus, Ambrosia trifida* (levees), *Bidens laevis, Eleocharis* spp., *Impatiens capensis, Peltandra virginica, Polygonum punctatum, Pontederia cordata*, and *Sagittaria* spp. Freshwater tidal flats (0-0.5 ppt) are characterized by sparse, low-growing mats of *Bidens eatonii, Crassula aquatica, Eriocaulon parkeri, Isoetes riparia, Lindernia dubia, Ludwigia palustris, Polygonum punctatum*, and *Sagittaria subulata*. Freshwater tidal communities in this region often contain one or more regionally or globally rare plant species, such as *Aeschynomene virginica, Eriocaulon parkeri*, and *Bidens bidentoides* (Walz et al. 2007). In addition, some of these same dominants may comprise another type of freshwater tidal marsh, a floating marsh (flotant), where the marsh vegetation and the underlying mat of roots, organic matter, and sediments detach from and float above the mineral substrate (Sasser et al. 1995, 1996, 2009). Flotants are the most common freshwater marsh in the Louisiana's delta marshes, estimated to cover approximately 130,000 ha (Sasser et al. 2009).

Many of the dominant and characteristic species of tidal freshwater wetlands (e.g., *Asclepias incarnata, Cephalanthus occidentalis, Echinochloa walteri, Hibiscus moscheutos, Kosteletzkya virginica, Eleocharis palustris, Eleocharis quadrangulata, Leersia oryzoides, Mikania scandens, Panicum virgatum, Peltandra virginica, Polygonum arifolium, Polygonum sagittatum, Polygonum punctatum, Polygonum glabrum (= Polygonum densiflorum), Polygonum hydropiperoides, Pontederia cordata, Rosa palustris, Rumex verticillatus, Sagittaria latifolia, Sagittaria lancifolia ssp. media (= Sagittaria falcata), Saururus cernuus, Schoenoplectus tabernaemontani, Schoenoplectus americanus, Scirpus cyperinus, Spartina cynosuroides, Typha latifolia, Typha domingensis, Typha angustifolia, Typha x glauca*, and *Zizania aquatica*) occur across a range of salinities that span fresh (<0.5 ppt) to oligohaline (0.5-5.0 ppt) (Odum et al. 1984). While some species that characterize this vegetation (e.g., *Spartina patens*) are tolerant of mesohaline water (5.0-18.0 ppt), they occur in freshwater tidal habitats in a mixture with species most common in oligohaline or freshwater habitats. Once salinity becomes greater than 5.0 ppt, freshwater marshes tend to turn over to saltwater marshes (Mitsch and Gosselink 1986c).

Non-tidal wetlands of the Atlantic and Gulf coasts commonly include species of *Eleocharis, Fimbristylis, Panicum, Rhynchospora, Sarracenia*, and *Xyris*. Graminoids include *Andropogon glomeratus, Aristida beyrichiana, Aristida palustris, Aristida stricta, Calamovilfa* spp., *Carex striata, Ctenium aromaticum, Cyperus haspan, Cyperus virens, Dichanthelium erectifolium, Dichanthelium wrightianum, Eleocharis elongata, Eleocharis equisetoides, Eleocharis microcarpa, Eleocharis quadrangulata, Fuirena scirpoidea, Fuirena squarrosa, Juncus abortivus, Juncus effusus, Juncus repens, Leersia hexandra, Panicum hemitomon, Panicum rigidulum, Panicum verrucosum, Panicum virgatum, Rhynchospora chapmanii, Rhynchospora corniculata, Rhynchospora filifolia, Rhynchospora harperi, Rhynchospora inundata, Rhynchospora tracyi, Saccharum* spp., and *Steinchisma hians*. Forbs include *Bartonia verna, Centella erecta, Lachnanthes caroliana, Lachnocaulon minus, Ludwigia glandulosa, Ludwigia linearis, Ludwigia* spp., *Proserpinaca* spp., *Rhexia alifanus, Rhexia cubensis, Rhexia* spp., *Sabatia angularis, Sagittaria longiloba, Sagittaria papillosa, Symphyotrichum subulatum*, and *Xyris jupicai*. Large wetland ferns such as *Osmunda cinnamomea* and *Osmunda regalis* also often dominate. Some examples have a very sparse tree component of *Magnolia virginiana, Pinus elliottii var. elliottii, Pinus palustris, Pinus serotina*, or *Taxodium* spp. and scattered shrubs, such as *Morella cerifera, Morella pensylvanica, Vaccinium corymbosum*, or *Clethra alnifolia*. Other woody plants may include *Acer rubrum, Cephalanthus occidentalis, Cyrilla racemiflora, Hypericum chapmanii, Hypericum fasciculatum, Hypericum tenuifolium (= Hypericum reductum), Ilex coriacea, Ilex glabra, Ilex myrtifolia, Lyonia lucida, Nyssa biflora*, and *Vaccinium* spp. Other characteristic and often dominant species for the northern part of the range (Massachusetts to New York or New Jersey) include *Cyperus dentatus, Dichanthelium meridionale, Eleocharis acicularis, Eleocharis robbinsii, Eriocaulon aquaticum (= Eriocaulon septangulare), Euthamia caroliniana (= Euthamia tenuifolia), Gratiola aurea, Juncus militaris, Juncus pelocarpus, Lobelia dortmanna*, and *Xyris difformis*. Along rivers in northeastern, central and southern Florida, *Cladium mariscus ssp. jamaicense* or *Panicum hemitomon* and *Polygonum punctatum* were apparently the historical dominant plant species.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: *Climate:* South of Virginia, the climate is humid, warm-temperate. From eastern Virginia to Cape Cod, Massachusetts, the climate is humid, cool-temperate.

*Soil/substrate/hydrology*: Tidal fresh marshes exist along low-relief coastlines and upper reaches of tidal rivers and creeks where there is sufficient freshwater input from rain and rivers, and enough tidal amplitude to reach upstream into marshes along bays and rivers (e.g., Hudson River, Delaware River, Cape Fear River). Both lunar and wind tides are important, though wind tides may be more important in areas where tidal amplitude is low (e.g., the Gulf coast and the embayed region of North Carolina and Virginia). Along the Atlantic coast this vegetation is often found on rivers where there is a geomorphological constriction that increases tidal amplitude (Odum et al. 1984). Within any specific region tidal marshes occur along elevational gradients that result in varying water depths. Tidal freshwater marshes tend to be common along the coastal edge of river systems with large watersheds and no dams (Tiner 2013). Most of the Atlantic coast freshwater tidal marshes are riverine (Odum et al. 1984). They formed as sea level rose after the last glaciation. Sediment carried by streams and rivers filled drowned river valleys that were downcut during the Pleistocene glaciations. Marshes built up and expanded as streams and rivers deposited their sediment load and the tides helped to extend the area of available habitat. Similar marshes are present along the Gulf coast, but in Louisiana where the majority of freshwater tidal marshes in the U.S. are found, freshwater marshes were formed through the deltaic processes of the Mississippi River (Gosselink 1984, Mitsch and Gosselink 1986c, Visser et al. 1998, 2000). Hydrology and salinity are the most important driving processes determining the range of potential vegetation in this division. Variations in flooding, sedimentation rates, erosion, scouring, wrack deposition and salinity are regular disturbances (Tiner 2013).

Tidal freshwater marshes occur in a variety of settings, including "mature marshes," marshes that may be more than 500 years old with a well-developed peat substrate (found most commonly on the Atlantic coast), "floating marshes," marshes that have broken loose from the mineral substrate and float on the water surface (found on the northern Gulf coast), and "new marshes" in areas where sedimentation by rivers is exceeding erosion and subsidence such as prograding deltas (found throughout the range) (Odum et al. 1984, Mitsch and Gosselink 1986c, 2000, Mitsch et al. 2009, Tiner 2013). In some areas, marshes have expanded in the recent past as a result of streams and rivers carrying and depositing higher sediment loads because of inland erosion (Odum et al. 1984). Soils in older marshes tend to be high in organic matter and those in younger marshes high in clays and silts (Odum et al. 1984).

Common characteristics of tidal freshwater marshes include variable rates of sedimentation and vertical accretion of sediments and organic matter (Perry et al. 2009). In many places, this is often offset by subsidence, reduced sedimentation due to water diversion, and a rising sea level. The substrate of tidal wetlands varies from primarily black, fibrous organic muck over sandy or silt clay loam occasionally mixed with woody peat, underlain by deep coastal plain quartzite sand deposits in New Jersey (Tedrow 1986), to thin or thick mats of floating roots and peat over muck and clay in Louisiana (Sasser et al. 2009). The New Jersey Geological Survey publication by Waksman et al. (1943) entitled "The Peats of New Jersey and Their Utilization" distinguishes marine salt marsh peats found along the coast and in bays that have fine mud rich in organic matter derived of decomposed grasses from the freshwater tidal marshes of drowned estuarine streams with freshwater alluvial peat and sedge-and-reed-peat characterized by coarse fibrous organic material often with wood particles and large amounts of mineral sediment (Walz et al. 2007). Odum et al. (1984) described the substrate underlying most tidal freshwater marshes in the eastern U.S. as "a dark, mucky soil" with high levels of silts and clays in the low marsh and higher levels of organic matter in the high marsh.

Tidal freshwater and oligohaline marshes are complex entities that are affected by movement of the salt line resulting from seasonal fluctuations in precipitation as well as changes in the periodicity and amplitude of tidal inundation (lunar and wind). Sea level rise due to global warming, and the resulting change in salt intrusion, vegetation composition, marsh acreage, and function, are serious concerns for the future of these critically important estuarine wetlands (Walz et al. 2007).

Non-tidal, freshwater marshes, wet prairie, and shrub swamp occur along rivers and in different types of depressions such as former lake basins, shallow peat-filled valleys, and zones around existing natural lakes (Kushlan 1990). Sites also includes oligotrophic wetlands maintained by seepage at the zone between an overlaying, permeable sandy layer and a lower layer of relatively impermeable material such as sandstone or clay. This vegetation also includes wetlands of low, flat plains on poorly drained soils, such as Ultisols, Spodosols, Inceptisols, and Entisols (Collins et al. 2001); some of these soils have an argillic horizon which impedes drainage and contributes to high water tables. The low areas where this vegetation occurs on barrier islands and similar immediate coastal areas are dune swales or other basins. These ponds have standing water well into the growing season, and many are permanently saturated. The vegetation also occurs in small basins and depressions, primarily in sandy terrain of the Atlantic Coastal Plain, from southeastern Virginia to Florida, including the Lake Wales Ridge area of central Florida. Most southeastern basins are formed by subsidence of surface sediments caused by solution in underlying limestone, but origins may be different from Delaware northward.

DISTRIBUTION

\*Geographic Range: The tidal freshwater marshes extends from the Atlantic provinces of Canada south to the inland portions of the Hudson, Connecticut, Merrimack, Kennebec, and Penobscot rivers and their tributaries, as well as the rivers of southern New Jersey, to include the Chesapeake Bay and Delaware Bay drainages. It also includes the embayed region of North Carolina and Virginia. It continues from the vicinity of Morehead City, North Carolina (south of the Embayed Region), south around Florida, and along the northern Gulf of Mexico in northwestern Florida, southern Alabama, and southeastern Mississippi. Large expanses are found in the deltaic and chenier plains of Louisiana. It extends along the Gulf coast south to approximately Corpus Christi Bay. These marshes are estimated to cover about 164,000 ha along the Atlantic Coast (Odum et al. 1984), and 468,000 ha in Louisiana (Chabreck 1972). Approximately one-half of the coastal tidal freshwater marshes that exist along the middle Atlantic seaboard occur in New Jersey (Odum et al. 1984). Not included here are estimates of area occupied by freshwater tidal marshes in the remaining coastal areas of the northeastern Gulf of Mexico and Canada. The non-tidal Atlantic and Gulf coastal wetlands have a similar range, from Massachusetts to Florida and Texas, and also rarely occur in the Great Lakes region of the United States and Canada (Ontario, Nova Scotia).

Nations: CA, MX?, US

States/Provinces: AL, AR?, CT, DE, FL, GA, IN, LA, LB, MA, MD, ME, MI, MS, NB, NC, NF, NJ, NS, NY, ON, PA, PE?, QC, RI?, SC, TX, VA, WI?, WV

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M066 | Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh |
| M067 | Atlantic & Gulf Coastal Plain Wet Prairie & Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-11-26 | D030 Alnus spp. / Typha spp. - Carex spp. Eastern North American Freshwater Wet Meadow, Riparian & Marsh Division | D030 split into D322 & D323 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Tidal Fresh Marshes | Tiner 2013 |  |
| = | Tidal Freshwater Marsh | Wieland 1994a |  |
| < | Tidal Freshwater Marshes | Odum et al. 1984 |  |
| = | Tidal Freshwater Marshes | Mitsch and Gosselink 1986d |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: W.J. Mitsch and J.G. Gosselink 1986c (and later editions 1993, 2000); R.W. Tiner (2013)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: J. Teague, C.W. Nordman, A.S. Weakley, D. Faber-Langendoen

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by D. Faber-Langendoen and M. Pyne.

Version Date: 30 Dec 2015

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2. Shrub & Herb Vegetation

2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland

M066. Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh

Type Concept Sentence: These fresh and oligohaline tidal marshes are discontinuous along the Atlantic and Gulf coasts of the United States and adjacent Canada from Newfoundland to Texas. Where found, they are the primary vegetation between outer tidal salt and brackish marshes and inland non-tidally influenced vegetation (upland or wetland).

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland (D322)

Elcode: M066

\*Scientific Name: *Zizania aquatica - Spartina patens - Pontederia cordata* Fresh-Oligohaline Tidal Marsh Macrogroup

\*Common (Translated Scientific) Name: Annual Wild Rice - Saltmeadow Cordgrass - Pickerelweed Fresh-Oligohaline Tidal Marsh Macrogroup

\*Colloquial Name: Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh

\*Type Concept: These fresh and oligohaline tidal marshes constitute the primary vegetation between outer tidal salt and brackish marshes and inland non-tidally influenced vegetation (upland or wetland). Examples are found from Newfoundland to Texas along the Atlantic and Gulf coasts of the United States and adjacent Canada. They may grade into uplands or non-tidal freshwater marshes and swamps. Most examples of this vegetation are characterized by a mixture of annual and perennial grasses, forbs, sedges, rushes, other grass-like plants, floating or submerged aquatics, shrubs, and scattered tree saplings. Dominance patterns change seasonally, yearly, and geographically. In addition to regional variability, freshwater tidal marshes may also exhibit floristic zonation based on age, water depth, tidal regime, and other factors, into a low and high marsh. This vegetation supports broad-leaved emergent plants such as *Nuphar advena, Nuphar orbiculata, Nuphar sagittifolia, Peltandra virginica, Pontederia cordata*, and *Sagittaria* spp.; annual and perennial grasses such as *Calamagrostis canadensis, Leersia oryzoides, Panicum hemitomon, Spartina cynosuroides, Spartina patens, Zizania aquatica, Zizaniopsis miliacea*; sedges and rushes such as *Carex* spp., *Cladium mariscus ssp. jamaicense, Eleocharis* spp., *Fuirena* spp., *Schoenoplectus pungens, Schoenoplectus tabernaemontani*; other grass-like plants and annual and perennial forbs such as *Acorus calamus, Amaranthus cannabinus, Ambrosia trifida, Bidens* spp., *Impatiens capensis, Hibiscus moscheutos, Kosteletzkya virginica, Polygonum* spp., *Sium suave, Typha* spp.; and scattered shrubs such as *Cephalanthus occidentalis* and *Morella cerifera*.

\*Diagnostic Characteristics: Among the hundreds of species found in freshwater tidal marshes (Tinder 2013), there appear to be few that are unique to this type, apart from *Aeschynomene virginica*, which is a federally threatened plant species (Odum et al. 1984). Tidal and non-tidal freshwater habitats share many species. Rather than the presence of specific freshwater species, this vegetation might better be differentiated by a mixture of wetland plants that are also tolerant of low salinity levels, including annual and perennial grasses, forbs, sedges, rushes, other grass-like plants, floating or submerged aquatics, shrubs, and scattered tree saplings. Dominance patterns change seasonally, yearly, and geographically. In addition to regional variability, freshwater tidal marshes may also exhibit floristic zonation based on age, water depth, tidal regime, and other factors, into a low and high marsh. Some species that occur in and may dominate or codominate various examples of this vegetation across its range include *Bidens* spp., *Cladium mariscus ssp. jamaicense, Eleocharis* spp., *Hydrocotyle* spp., *Panicum hemitomon, Peltandra virginica, Polygonum* spp., *Pontederia cordata, Sagittaria* spp., *Schoenoplectus pungens, Schoenoplectus tabernaemontani*, and *Spartina cynosuroides, Spartina patens, Zizania aquatica*, and *Zizaniopsis miliacea*.

\*Classification Comments: Some researchers consider fresh tidal marshes narrowly, including only marshes with salinity levels below 0.5 ppt. Based on floristic similarities between fresh and oligohaline tidal marshes, we have taken a broader view by including both in this macrogroup. We also include vegetation influenced by irregular, low-amplitude, wind-driven tides, not just lunar tides. Floristic overlap can be seen in many studies of fresh and oligohaline marshes (Penfound and Hathaway 1938, Chabreck 1972, Gosselink et al. 1979, Gosselink 1984, Mitsch and Gosselink 1986c, Visser et al. 1998, 2000, Tiner 2013). Salinity levels vary seasonally, temporally and spatially but as indicated by vegetation dominants are expected to be in the range of fresh to oligohaline. Species composition strongly overlaps with non-tidal freshwater marshes. Association membership of tidal marsh macrogroups/groups (fresh/oligohaline versus salt/brackish) may need further review. More research is needed to interpret the complex interactions between temporal and spatial disturbance patterns (e.g., hydrology, salinity), geomorphology, species life histories, and other factors to better elucidate the rangewide and local patterns in vascular plant communities of freshwater tidal marshes. In addition, more work is needed to better understand the ecology of nonvascular plants in this ecosystem (Mitsch and Gosselink 1986c).

This macrogroup currently encompasses a single group that represents all of the tidal fresh to oligohaline marshes of the Atlantic and Gulf coasts of North America. Further consideration should be given to a latitudinal split. Such a split might require additional floristic information from marsh occurrences along the latitudinal gradient. The current alliance structure reflects this separation except for three broad-ranging alliances and associations that would need to be split: ~*Zizania aquatica - Zizaniopsis miliacea* Tidal Freshwater Marsh Alliance (A1485)$$, ~*Stuckenia pectinata - Zannichellia palustris - Ceratophyllum demersum* Freshwater Subtidal Marsh Alliance (A3581)$$, and ~*Morella cerifera - Rosa palustris* Tidal Freshwater Shrubland Alliance (A0806)$$. In addition, more information is needed to better document the relative role of annuals in this vegetation regionally. Are annuals more important in northern latitudes? Are perennial grasses more important along the Gulf Coast? One common perennial grass in this vegetation, *Zizania aquatica*, acts as an annual in northern latitudes and a perennial in southern (Godfrey and Wooten 1979). Do the unique deltaic processes of coastal Louisiana support floristic differences at the group level, or do the differences between the deltaic processes of Louisiana marshes and the processes associated with drowned river valleys more common throughout the rest of the range of this vegetation support such floristic differences? Great temporal and spatial floristic variability at local and regional scales, especially the seasonal and annual differences (driven by a myriad of interrelated factors such as hydrology, sedimentation, salinity, erosion, scouring, wrack deposition, seed banks, competition, herbivory, and other disturbances) complicate the sampling and classification of this vegetation, especially at the lower levels such as alliance and association.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M710 | Caribbean Freshwater Marsh, Wet Meadow & Shrubland |  |
| M880 | Eastern North American Wet Shoreline Vegetation |  |
| M069 | Eastern North American Marsh, Wet Meadow & Shrubland |  |
| M067 | Atlantic & Gulf Coastal Plain Wet Prairie & Marsh |  |
| M079 | North American Atlantic & Gulf Coastal Salt Marsh |  |
| M108 | Eastern North American Freshwater Aquatic Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Most examples of this vegetation are characterized by a mixture of annual and perennial grasses, forbs, sedges, rushes, other grass-like plants, floating or submerged aquatics, and more rarely, shrubs, and scattered tree saplings (Tiner 2013). The importance of annuals in this vegetation can lead to high variability in yearly and seasonal dominance patterns. In some high marsh occurrences, annual forbs begin to grow early in the season and appear to dominate, but a little latter perennials overtop them, only to be overtopped themselves by emergent annuals later in the season (Leck et al. 2009).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: There are no plant species unique to freshwater tidal habitats (Odum et al. 1984), and the list of possible components numbers in the hundreds (Tiner 2013). Most examples of this vegetation are characterized by a mixture of annual and perennial grasses, forbs, sedges, rushes, other grass-like plants, floating or submerged aquatics, shrubs, and scattered tree saplings (Tiner 2013). Dominance patterns change seasonally, yearly, and geographically. In addition to regional variability, freshwater tidal marshes may also exhibit floristic zonation based on age, water depth, tidal regime, and other factors, into a low and high marsh (Odum et al. 1984, Mitsch and Gosselink 1986c, Tiner 2013). Zonation in freshwater tidal marshes is not as pronounced as in salt marshes (Odum et al. 1984, Mitsch and Gosselink 1986c, Tiner 2013), and may often be more of a spatial mosaic driven by a diverse seed bank (Leck and Simpson 1987). Where present, low marsh is younger, more erodible, more deeply flooded for longer periods of time, has lower litter accumulation, lower organic matter in the soils, and lower primary productivity than high marsh (Odum et al. 1984, Mitsch and Gosselink 1986c, Tiner 2013).

The low marsh is typically characterized by species such as *Amaranthus cannabinus, Heteranthera reniformis, Nuphar advena, Nuphar orbiculata, Nuphar sagittifolia, Peltandra virginica, Pontederia cordata, Sagittaria* spp., *Schoenoplectus pungens, Schoenoplectus tabernaemontani*, and *Zizania aquatica*. The high marsh is more diverse and often includes a mixture of annual and perennial grasses, forbs, sedges, rushes, other grass-like plants, and shrubs (Odum et al. 1984, Mitsch and Gosselink 1986c). In the mid-Atlantic a high marsh may be dominated by a mixed group of annuals in mid-season (e.g., *Acorus calamus, Bidens laevis, Hibiscus moscheutos, Impatiens capensis, Iris versicolor, Polygonum* spp. *Pilea pumila, Amaranthus cannabinus, Symphyotrichum subulatum, Zizania aquatica* and others); later in the season perennial grasses such as *Spartina cynosuroides, Typha* spp., and *Zizaniopsis miliacea* may become monodominant (Odum et al. 1984, Mitsch and Gosselink 1986c, Tiner 2013). Dominants in Louisiana freshwater tidal marshes include *Bidens laevis, Eleocharis* spp., *Hydrocotyle* spp., *Panicum hemitomon, Sagittaria lancifolia, Schoenoplectus pungens, Spartina patens*, and *Zizaniopsis miliacea*. Associates include *Alternanthera philoxeroides* (non-native), *Bacopa monnieri, Cladium mariscus ssp. jamaicense (= Cladium jamaicense), Echinochloa walteri, Leptochloa fusca ssp. fascicularis (= Leptochloa fascicularis), Pluchea camphorata, Pontederia cordata, Sagittaria* spp., *Schoenoplectus californicus*, and *Vigna luteola* (Gosselink et al. 1979, Gosselink 1984, Visser et al. 1998, 2000). Plant composition of freshwater tidal marshes in New Jersey generally occurs as a mosaic of patches dominated by a few or a single species and has dramatic seasonal variation. Tidal freshwater marshes (0-0.5 ppt) are characterized by *Acorus calamus, Ambrosia trifida* (levees), *Bidens laevis, Eleocharis* spp., *Impatiens capensis, Peltandra virginica, Polygonum punctatum, Pontederia cordata*, and *Sagittaria* spp. Freshwater tidal flats (0-0.5 ppt) are characterized by sparse, low-growing mats of *Bidens eatonii, Crassula aquatica, Eriocaulon parkeri, Isoetes riparia, Lindernia dubia, Ludwigia palustris, Polygonum punctatum*, and *Sagittaria subulata*. Freshwater tidal communities in this region often contain one or more regionally or globally rare plant species, such as *Aeschynomene virginica, Eriocaulon parkeri*, and *Bidens bidentoides* (Walz et al. 2007). In addition, some of these same dominants may comprise another type of freshwater tidal marsh, a floating marsh (flotant), where the marsh vegetation and the underlying mat of roots, organic matter, and sediments detach from and float above the mineral substrate (Sasser et al. 1995, 1996, 2009). Flotants are the most common freshwater marsh in the Louisiana's delta marshes, estimated to cover approximately 130,000 ha (Sasser et al. 2009).

Many of the dominant and characteristic species in this macrogroup (e.g., *Asclepias incarnata, Cephalanthus occidentalis, Echinochloa walteri, Hibiscus moscheutos, Kosteletzkya virginica, Eleocharis palustris, Eleocharis quadrangulata, Leersia oryzoides, Mikania scandens, Panicum virgatum, Peltandra virginica, Polygonum arifolium, Polygonum sagittatum, Polygonum punctatum, Polygonum glabrum (= Polygonum densiflorum), Polygonum hydropiperoides, Pontederia cordata, Rosa palustris, Rumex verticillatus, Sagittaria latifolia, Sagittaria lancifolia ssp. media (= Sagittaria falcata), Saururus cernuus, Schoenoplectus tabernaemontani, Schoenoplectus americanus, Scirpus cyperinus, Spartina cynosuroides, Typha latifolia, Typha domingensis, Typha angustifolia, Typha x glauca*, and *Zizania aquatica*) occur across a range of salinities that span fresh (<0.5 ppt) to oligohaline (0.5-5.0 ppt) (Odum et al. 1984). While some species that characterize this vegetation (e.g., *Spartina patens*) are tolerant of mesohaline water (5.0-18.0 ppt), they occur in freshwater tidal habitats in a mixture with species most common in oligohaline or freshwater habitats. Once salinity becomes greater than 5.0 ppt, freshwater marshes tend to turn over to saltwater marshes (Mitsch and Gosselink 1986c).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Hydrology and salinity are the most important driving processes determining the range of potential vegetation in this macrogroup. Variations in flooding, sedimentation rates, erosion, scouring, wrack deposition and salinity are regular disturbances (Tiner 2013). Seed bank dynamics also drive the temporal and spatial diversity (Leck et al. 2009). Herbivory and competition also play an important role in vegetation patterns and some components (e.g., *Typha* and *Peltandra virginica*) are reported to be allelopathic (Bonasera et al. 1979). Rising sea level is an important driver of longer term vegetation trends, including expansion into adjacent swamp areas. Fire is also an important natural process in all but the smallest and most isolated patches. C. Frost (pers. comm.) estimates that many marshes burned as often as every three years in presettlement times and were an important source of ignition for adjacent communities. Marshes that have not burned recently have lower species richness, are more strongly dominated by the large graminoids, and are believed to be poorer habitat for waterfowl. Lack of fire may also allow for invasion of trees into the marsh. Marshes often show evidence of transition to or from treed communities, in the form of young invading trees and shrubs or standing dead older trees (Odum et al. 1984, Tiner 2013). More research is needed to interpret the complex interactions between temporal and spatial disturbance patterns (e.g., hydrology, salinity, sedimentation, erosion, herbivory, hurricanes, etc.), geomorphology, species life histories, and other factors to better elucidate the rangewide and local patterns in vascular plant communities of freshwater tidal marshes. It is unclear how subsidence, freshwater withdrawal, sea level rise, and climate change will impact this ecosystem, but changes are expected. Though causation is unclear, vegetation changes have already been documented in Louisiana since 1968 (Visser et al. 1999) and other areas (Barendregt and Swarth 2013).

ENVIRONMENT

Environmental Description: Tidal fresh marshes exist along low-relief coastlines and upper reaches of tidal rivers and creeks where there is sufficient freshwater input from rain and rivers, and enough tidal amplitude to reach upstream into marshes along bays and rivers (e.g., Hudson River, Delaware River, Cape Fear River). Both lunar and wind tides are important, though wind tides may be more important in areas where tidal amplitude is low (e.g., the Gulf coast and the embayed region of NC and VA). Along the Atlantic coast this vegetation is often found on rivers where there is a geomorphological constriction that increases tidal amplitude (Odum et al. 1984). Within any specific region tidal marshes occur along elevational gradients that result in varying water depths. Tidal freshwater marshes tend to be common along the coastal edge of river systems with large watersheds and no dams (Tiner 2013). Most of the Atlantic coast freshwater tidal marshes are riverine (Odum et al. 1984). They formed as sea level rose after the last glaciation. Sediment carried by streams and rivers filled drowned river valleys that were downcut during the Pleistocene glaciations. Marshes built up and expanded as streams and rivers deposited their sediment load and the tides helped to extend the area of available habitat. Similar marshes are present along the Gulf coast, but in Louisiana where the majority of freshwater tidal marshes in the U.S. are found, freshwater marshes were formed through the deltaic processes of the Mississippi River (Gosselink 1984, Mitsch and Gosselink 1986c, Visser et al. 1998, 2000). Hydrology and salinity are the most important driving processes determining the range of potential vegetation in this macrogroup. Variations in flooding, sedimentation rates, erosion, scouring, wrack deposition and salinity are regular disturbances (Tiner 2013).

Tidal freshwater marshes occur in a variety of settings, including "mature marshes," marshes that may be more than 500 years old with a well-developed peat substrate (found most commonly on the Atlantic coast), "floating marshes," marshes that have broken loose from the mineral substrate and float on the water surface (found on the northern Gulf coast), and "new marshes" in areas where sedimentation by rivers is exceeding erosion and subsidence such as prograding deltas (found throughout the range) (Odum et al. 1984, Mitsch and Gosselink 1986c, 2000, Mitsch et al. 2009, Tiner 2013). In some areas, marshes have expanded in the recent past as a result of streams and rivers carrying and depositing higher sediment loads because of inland erosion (Odum et al. 1984). Soils in older marshes tend to be high in organic matter and those in younger marshes high in clays and silts (Odum et al. 1984).

More research is needed to interpret the complex interactions between temporal and spatial disturbance patterns (e.g., hydrology, salinity, sedimentation, erosion, herbivory, hurricanes, etc.), geomorphology, species life histories, and other factors to better elucidate the rangewide and local patterns in vascular plant communities of freshwater tidal marshes. It is unclear how subsidence, freshwater withdrawal, sea level rise, and climate change will impact this ecosystem, but changes are expected. Though causation is unclear, vegetation changes have already been documented in Louisiana since 1968 (Visser et al. 1999) and New Jersey (Leck et al. 2009).

Common characteristics of tidal freshwater marshes include variable rates of sedimentation and vertical accretion of sediments and organic matter (Perry et al. 2009). In many places, this is often offset by subsidence, reduced sedimentation due to water diversion, and a rising sea level. The substrate of tidal wetlands varies from primarily black, fibrous organic muck over sandy or silt clay loam occasionally mixed with woody peat, underlain by deep coastal plain quartzite sand deposits in New Jersey (Tedrow 1986), to thin or thick mats of floating roots and peat over muck and clay in Louisiana (Sasser et al. 2009). The New Jersey Geological Survey publication by Waksman et al. (1943) entitled "The Peats of New Jersey and Their Utilization" distinguishes marine salt marsh peats found along the coast and in bays that have fine mud rich in organic matter derived of decomposed grasses from the freshwater tidal marshes of drowned estuarine streams with freshwater alluvial peat and sedge-and-reed-peat characterized by coarse fibrous organic material often with wood particles and large amounts of mineral sediment (Walz et al. 2007). Odum et al. (1984) described the substrate underlying most tidal freshwater marshes in the eastern U.S. as "a dark, mucky soil" with high levels of silts and clays in the low marsh and higher levels of organic matter in the high marsh.

Tidal freshwater and oligohaline marshes are complex entities that are affected by movement of the salt line resulting from seasonal fluctuations in precipitation as well as changes in the periodicity and amplitude of tidal inundation (lunar and wind). Sea level rise due to global warming, and the resulting change in salt intrusion, vegetation composition, marsh acreage, and function, are serious concerns for the future of these critically important estuarine wetlands (Walz et al. 2007).

DISTRIBUTION

\*Geographic Range: Vegetation of this macrogroup extends from the Atlantic provinces of Canada south to the inland portions of the Hudson, Connecticut, Merrimack, Kennebec, and Penobscot rivers and their tributaries, as well as the rivers of southern New Jersey, to include the Chesapeake Bay and Delaware Bay drainages. It also includes the embayed region of North Carolina and Virginia. It continues from the vicinity of Morehead City, North Carolina (south of the Embayed Region), south around Florida, and along the northern Gulf of Mexico in northwestern Florida, southern Alabama, and southeastern Mississippi. Large expanses are found in the deltaic and chenier plains of Louisiana. It extends along the Gulf coast south to approximately Corpus Christi Bay. These marshes are estimated to cover about 164,000 ha along the Atlantic Coast (Odum et al. 1984), and 468,000 ha in Louisiana (Chabreck 1972). Approximately one-half of the coastal tidal freshwater marshes that exist along the middle Atlantic seaboard occur in New Jersey (Odum et al. 1984). Not included here are estimates of area occupied by freshwater tidal marshes in the remaining coastal areas of the northeastern Gulf of Mexico and Canada.

Nations: CA, MX?, US

States/Provinces: AL, CT, DE, GA, LA, LB, MA, MD, ME, MS, NB, NC, NF, NJ, NS, NY, PA, PE?, QC, SC, TX, VA

USFS Ecoregions (2007) [optional]: 211C:C?, 211D:CC, 221A:CC, 232A:CC, 232C:CC, 232D:CC, 232E:CC, 232G:CC, 232H:CC, 232I:CC, 232L:CC, 255D:??, 411A:??

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G110 | Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Floodplain Marsh | FNAI 2010a |  |
| < | Tidal Fresh Marshes | Tiner 2013 |  |
| < | Tidal Freshwater Marshes | Odum et al. 1984 |  |
| = | Tidal Freshwater Marshes | Mitsch and Gosselink 1986d |  |
| = | Tidal freshwater marsh/wet coastal prairie | MSNHP 2006 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: W.J. Mitsch and J.G. Gosselink 1986c (and later editions 1993, 2000); R.W. Tiner (2013)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: J. Teague

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by D. Faber-Langendoen and M. Pyne.

Version Date: 15 Jun 2015

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2. Shrub & Herb Vegetation

2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland

M067. Atlantic & Gulf Coastal Plain Wet Prairie & Marsh

Type Concept Sentence: Common plants of these herbaceous or shrub wetlands include species of *Eleocharis, Fimbristylis, Panicum, Rhynchospora, Sarracenia*, and *Xyris*, or shrubs *Cephalanthus occidentalis* or *Vaccinium* spp., which occur in warm-temperate Atlantic and Gulf coastal plains depressions and basins, seepage slopes, interdunal swales and poorly drained wet flats.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.4.Ne. Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland (D322)

Elcode: M067

\*Scientific Name: *Rhynchospora* spp. - *Eleocharis* spp. - *Panicum* spp. Atlantic & Gulf Coastal Plain Wet Prairie & Marsh Macrogroup

\*Common (Translated Scientific) Name: Beaksedge species - Spikerush species - Panicgrass species Atlantic & Gulf Coastal Plain Wet Prairie & Marsh Macrogroup

\*Colloquial Name: Atlantic & Gulf Coastal Plain Wet Prairie & Marsh

\*Type Concept: Common taxa of these marshes and wet prairies include species of *Eleocharis, Fimbristylis, Panicum, Rhynchospora, Sarracenia*, and *Xyris*. Also included are warm-temperate shrub swamps dominated by the shrubs *Cephalanthus occidentalis, Vaccinium corymbosum, Vaccinium formosum*, or *Vaccinium fuscatum*. These wetlands occur on the Atlantic and Gulf coastal plains in depressions and basins, seepage slopes, interdunal swales and poorly drained wet flats. The vegetation ranges from floating-leaved aquatics in deeper basins, to emergent marsh in semipermanent water, to drawdown zones with diverse small graminoid and forb vegetation, to shrub swamp and shrub edges. Wet prairie vegetation is also found on extensive wet flats and consists of primarily herbaceous wetland vegetation with relatively thick cover of graminoid species. Examples occupy low, flat plains on poorly drained soils, often saturated for 50-100 days per year. In addition to saturation or flooding, occasional to frequent fires, including during the early growing season, promote the maintenance of this vegetation.

\*Diagnostic Characteristics: These are herbaceous wetlands, often mixed with low shrubs. They occur in depressions, basins, and interdunal swales, and on seepage slopes, or on wet flats on the coastal plain of the southeastern United States, including some areas as far north as Cape Cod, Massachusetts. Common taxa include species of graminoids *Rhynchospora, Panicum, Eleocharis, Aristida, Xyris*, forbs *Pontederia cordata* and *Sarracenia* and shrubs *Hypericum, Vaccinium, Ilex*, and *Cephalanthus occidentalis*.

\*Classification Comments: Generally this macrogroup represents warm-temperate vegetation, extending into the cool-temperate zone in New England and with some disjunct occurrences in the Great Lakes area. It includes a wide variety of mainly herbaceous graminoid wetlands, and also some forb and shrub wetlands. Wetland interdune swales are included. Federal land distribution should be updated to include Assateague, Cape Cod, Chincoteague, Fire Island, Plum Island, and maybe others.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M161 | Pond-cypress Basin Swamp | supports trees *Taxodium* spp., *Pinus elliottii var. elliottii*, or *Nyssa biflora*. Canopy cover may be sparse, and herb and forb composition may be very similar to M067. |
| M065 | Southeastern Coastal Bog & Fen | is dominated by evergreen shrubs, in bog and fen habitats, such as pocosins. |
| M071 | Great Plains Marsh, Wet Meadow, Shrubland & Playa | is cool temperate, occurs in the Great Plains only, and does not support *Rhynchospora* spp., but may be dominated by *Eleocharis palustris, Panicum obtusum*, or *Panicum virgatum*. |
| M069 | Eastern North American Marsh, Wet Meadow & Shrubland | is cool temperate, occurs in the Midwest, Appalachia and New England outside the Coastal Plain, and is not dominated by species of *Rhynchospora, Panicum*, or *Eleocharis*. Both occur in Massachusetts, M069 on the coastal plain and M067 inland away from the coastal plain. |
| M303 | Eastern-Southeastern North American Ruderal Marsh, Wet Meadow & Shrubland | includes only ruderal vegetation, and includes otherwise similar warm temperate marsh in addition to cool temperate marsh. |
| M066 | Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh | only includes freshwater tidal marsh, but M067 is not tidal. |
| M108 | Eastern North American Freshwater Aquatic Vegetation |  |

Similar NVC Types General Comments [optional]: Similar vegetation also occurring on the warm-temperate Southeastern Coastal Plain is either an open woodland (M161), ruderal (M303) or tidal freshwater (M066).

VEGETATION

Physiognomy and Structure Summary: These wetlands are generally dominated by graminoid vegetation. There often are some woody plants, such as low shrubs and/or scattered tall shrubs or very sparse trees present. The tall shrubs have more cover on sites that have not been recently burned. Included here are southern shrublands dominated by *Cephalanthus occidentalis* or *Vaccinium* spp.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Common taxa include species of *Eleocharis, Fimbristylis, Panicum, Rhynchospora, Sarracenia*, and *Xyris*. Graminoids include *Andropogon glomeratus, Aristida beyrichiana, Aristida palustris, Aristida stricta, Calamovilfa* spp., *Carex striata, Ctenium aromaticum, Cyperus haspan, Cyperus virens, Dichanthelium erectifolium, Dichanthelium wrightianum, Eleocharis elongata, Eleocharis equisetoides, Eleocharis microcarpa, Eleocharis quadrangulata, Fuirena scirpoidea, Fuirena squarrosa, Juncus abortivus, Juncus effusus, Juncus repens, Leersia hexandra, Panicum hemitomon, Panicum rigidulum, Panicum verrucosum, Panicum virgatum, Rhynchospora chapmanii, Rhynchospora corniculata, Rhynchospora filifolia, Rhynchospora harperi, Rhynchospora inundata, Rhynchospora tracyi, Saccharum* spp., and *Steinchisma hians*. Forbs include *Bartonia verna, Centella erecta, Lachnanthes caroliana, Lachnocaulon minus, Ludwigia glandulosa, Ludwigia linearis, Ludwigia* spp., *Proserpinaca* spp., *Rhexia alifanus, Rhexia cubensis, Rhexia* spp., *Sabatia angularis, Sagittaria longiloba, Sagittaria papillosa, Symphyotrichum subulatum*, and *Xyris jupicai*. Large wetland ferns such as *Osmunda cinnamomea* and *Osmunda regalis* also often dominate. Some examples have a very sparse tree component of *Magnolia virginiana, Pinus elliottii var. elliottii, Pinus palustris, Pinus serotina*, or *Taxodium* spp. and scattered shrubs, such as *Morella cerifera, Morella pensylvanica, Vaccinium corymbosum*, or *Clethra alnifolia*. Other woody plants may include *Acer rubrum, Cephalanthus occidentalis, Cyrilla racemiflora, Hypericum chapmanii, Hypericum fasciculatum, Hypericum tenuifolium (= Hypericum reductum), Ilex coriacea, Ilex glabra, Ilex myrtifolia, Lyonia lucida, Nyssa biflora*, and *Vaccinium* spp. Other characteristic and often dominant species for the northern part of the range (Massachusetts to New York or New Jersey) include *Cyperus dentatus, Dichanthelium meridionale, Eleocharis acicularis, Eleocharis robbinsii, Eriocaulon aquaticum (= Eriocaulon septangulare), Euthamia caroliniana (= Euthamia tenuifolia), Gratiola aurea, Juncus militaris, Juncus pelocarpus, Lobelia dortmanna*, and *Xyris difformis*. Along rivers in northeastern, central and southern Florida, *Cladium mariscus ssp. jamaicense* or *Panicum hemitomon* and *Polygonum punctatum* were apparently the historical dominant plant species.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: While many of these wetlands are in depressions, slopes and flats, examples which are along rivers are subject to river flooding. The depth, duration and season of flooding are primary influences on the dynamics of this wetland vegetation (Kirkman et al. 2012). Large fluctuations in the water level cause both anaerobic and dry conditions, which promote herbaceous plants rather than trees. Due to these factors and the irregular occurrence of wildland fire during dry conditions, these habitats are maintained as open herbaceous (including some shrub) vegetation. In the humid warm-temperate climatic zone, forests and woodlands are the dominant natural vegetation. Plant species composition (including dominants) may vary seasonally or annually depending on inundation and fire history. Fire may also be necessary to stimulate growth, flowering and seed production of many herbaceous species found in communities of this macrogroup. In the absence of fire, vegetation may become heavily wooded, resulting in the eventual elimination of the herbaceous vegetation (Folkerts 1982).

ENVIRONMENT

Environmental Description: *Climate:* South of Virginia, the climate is humid, warm-temperate. From eastern Virginia to Cape Cod, Massachusetts, the climate is humid, cool-temperate. *Soil/substrate/hydrology*: This macrogroup includes non-tidal, freshwater herbaceous marsh, wet prairie, and shrub swamp vegetation. These wetlands occur along rivers and in different types of depressions such as former lake basins, shallow peat-filled valleys, and zones around existing natural lakes (Kushlan 1990). It also includes oligotrophic wetlands maintained by seepage at the zone between an overlaying, permeable sandy layer and a lower layer of relatively impermeable material such as sandstone or clay. This vegetation also includes wetlands of low, flat plains on poorly drained soils, such as Ultisols, Spodosols, Inceptisols, and Entisols (Collins et al. 2001); some of these soils have an argillic horizon which impedes drainage and contributes to high water tables. The low areas where this vegetation occurs on barrier islands and similar immediate coastal areas are dune swales or other basins. These ponds have standing water well into the growing season, and many are permanently saturated. The vegetation also occurs in small basins and depressions, primarily in sandy terrain of the Atlantic Coastal Plain, from southeastern Virginia to Florida, including the Lake Wales Ridge area of central Florida. Most southeastern basins are formed by subsidence of surface sediments caused by solution in underlying limestone, but origins may be different from Delaware northward.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs primarily in the warm-temperate climatic zone on the Atlantic and Gulf coastal plains, including the Mississippi Embayment. It ranges from Massachusetts to Florida and Texas, and also rarely occurs in the Great Lakes region of the United States and Canada (Ontario).

Nations: CA, MX?, US

States/Provinces: AL, AR?, CT?, DE, FL, GA, IN, LA, MA, MD, MI, MS, NC, NJ, NY, ON, RI?, SC, TX, VA, WI?, WV

USFS Ecoregions (2007) [optional]: 221Ab:CCC, 221Ad:CCC, 221An:CCC, 232A:CC, 232B:CC, 232C:CC, 232D:CC, 232E:CC, 232Fb:CCC, 232G:CC, 232H:CP, 232I:CC, 232J:CC, 232K:CC, 232L:CC, 234A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G188 | Atlantic & Gulf Coastal Plain River & Basin Freshwater Marsh |
| G776 | Atlantic & Gulf Coastal Plain Shrub Swamp |
| G777 | Atlantic & Gulf Coastal Interdunal Marsh & Prairie |
| G111 | Atlantic & Gulf Coastal Plain Pondshore & Wet Prairie |
| G187 | Atlantic & Gulf Coastal Plain Seep |
| G752 | Northern & Mid-Atlantic Coastal Wetland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Bog Swamp (Okefenokee), Prairies | Wharton 1978 |  |
| < | Deep Fresh-water Marshes | Penfound 1952 |  |
| < | Depression marshes | Edwards et al. 2013 |  |
| < | Freshwater Marsh | Kushlan 1990 |  |
| < | Freshwater marshes | Penfound 1967 |  |
| = | Graminoid-dominated wetlands | Christensen 2000 | This does not include the shrub swamps which are included with M067. |
| < | Gulf Coast pitcher plant bog | Folkerts 1982 |  |
| ? | Herb bogs (pitcher plant bogs) | Wharton 1978 |  |
| < | Interdunal wetlands | Edwards et al. 2013 |  |
| < | Limesink | Wharton 1978 |  |
| < | Marsh Ponds (in part) | Wharton 1978 |  |
| < | Okefenokee Swamp Prairies | Edwards et al. 2013 |  |
| < | Seepage slope herb bogs | Edwards et al. 2013 |  |
| < | Shallow Fresh-water Marshes | Penfound 1952 |  |
| < | Southern Depression Wetlands, open- canopied herbaceous-dominated communities | Kirkman et al. 2012 |  |
| < | Southern wet meadow (grass-sedge bog) | Penfound 1967 |  |
| < | grass-sedge savannah | Clewell 1981 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C.W. Nordman and A.S. Weakley

Acknowledgments [optional]:

Version Date: 15 Oct 2014

REFERENCES

\*References [Required if used in text]:

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Penfound, W. T. 1967. A physiognomic classification of vegetation in conterminous United States. Botanical Review 33:289-320.

Wharton, C. H. 1978. The natural environments of Georgia. Georgia Department of Natural Resources, Atlanta. 227 pp.

2.C.5. Salt Marsh

Salt Marsh is a wetland that has shallow water and levels that usually fluctuate due primarily to tides along the coast or changes in water depth in depressions. Coastal salt marshes are primarily intertidal; that is, they are found in areas at least occasionally inundated by high tide but not flooded during low tide, including estuaries, lagoons, and the lee side of barrier islands. The vegetation comprises emergent shrubs and herbs with at least 10% cover, especially saline or halophytic species. They occur at all latitudes around the globe, but are concentrated in the temperate mid-latitudes (23-70°N and S).

2. Shrub & Herb Vegetation

2.C.5.El. Eastern Pacific Coastal Salt Marsh

D269. Eastern Pacific Coastal Salt Marsh

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.5.El. Salt Marsh (F035)

Elcode: D269

\*Scientific Name: Eastern Pacific Coastal Salt Marsh Division

\*Common (Translated Scientific) Name: Eastern Pacific Coastal Salt Marsh Division

\*Colloquial Name: Eastern Pacific Coastal Salt Marsh

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BZ, CO, CR, EC, HN, MX, NI, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M737 | Mesoamerican-South American Pacific Coastal Salt Marsh |
| M736 | Mexican Pacific Coastal Salt Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.El. Eastern Pacific Coastal Salt Marsh

M737. Mesoamerican-South American Pacific Coastal Salt Marsh

Type Concept Sentence: Communities that develop in depressions formed behind the coastal dunes or due to the formation of clay banks in estuarine areas which by the action of the tides can vary in position and shape; they also occur behind the mangrove forests.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.El. Eastern Pacific Coastal Salt Marsh (D269)

Elcode: M737

\*Scientific Name: Mesoamerican-South American Pacific Coastal Salt Marsh Macrogroup

\*Common (Translated Scientific) Name: Mesoamerican-South American Pacific Coastal Salt Marsh Macrogroup

\*Colloquial Name: Mesoamerican-South American Pacific Coastal Salt Marsh

\*Type Concept: This macrogroup contains plant communities that develop in depressions formed behind the coastal dunes or due to the formation of clay banks in estuarine areas which by the action of the tides can vary in position and shape; they also occur behind the mangrove forests. These brackish lagoons receive freshwater from precipitation, rivers or springs and saltwater from filtration or directly during high tides. This causes the salinity to be variable and seasonal. The soils are generally clayish, sometimes with a layer of silt and sand on the surface; in the dry season, a layer of salt deposits forms on the surface. Diagnostic species are a mix of salt-tolerant grasses, shrubs and succulents, such as *Blechnum serrulatum, Centrosema* sp., *Crinum erubescens, Hyptis* sp., *Ludwigia* spp., *Mimosa pellita (= Mimosa pigra), Sagittaria lancifolia, Thalia geniculata, Eleocharis acutangula, Cyperus ligularis, Spartina spartinae, Fimbristylis cymosa (= Fimbristylis spathacea), Chloris barbata (= Chloris inflata), Urochloa fusca (= Brachiaria fasciculata), Cordia curassavica, Marsdenia rotheana, Opuntia eliator, Acanthocereus tetragonus (= Acanthocereus pentagonus), Acacia costaricensis, Parkinsonia aculeata, Pavonia sessiliflora, Waltheria indica, Jacquinia macrocarpa, Sesuvium portulacastrum, Salicornia* spp. Scattered juveniles of mangrove species can occur as well.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BZ, CO, CR, EC, HN, MX, NI, PA

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.El. Eastern Pacific Coastal Salt Marsh

M736. Mexican Pacific Coastal Salt Marsh

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.El. Eastern Pacific Coastal Salt Marsh (D269)

Elcode: M736

\*Scientific Name: Mexican Pacific Coastal Salt Marsh Macrogroup

\*Common (Translated Scientific) Name: Mexican Pacific Coastal Salt Marsh Macrogroup

\*Colloquial Name: Mexican Pacific Coastal Salt Marsh

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: MX

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Em. South American Lowlands Interior Brackish Marsh

D270. South American Lowlands Interior Brackish Marsh

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.5.Em. Salt Marsh (F035)

Elcode: D270

\*Scientific Name: South American Lowlands Interior Brackish Marsh Division

\*Common (Translated Scientific) Name: South American Lowlands Interior Brackish Marsh Division

\*Colloquial Name: South American Lowlands Interior Brackish Marsh

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M738 | Chaco-Espinal Brackish Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Em. South American Lowlands Interior Brackish Marsh

M738. Chaco-Espinal Brackish Marsh

Type Concept Sentence: Hygro-halophyllous shrub-, grass- or forb-dominated communities of the Chaco and the Espinal in depressions of fluvial or lacustrine origin, mostly in endorheic basins with an extended dry season where salts accumulate after water evaporation. A sparse tree layer can occur with species of *Cereus* (an arborescent cacti), the palm *Copernicia alba*, and *Prosopis* spp. Among the herbaceous species are *Allenrolfea patagonica, Atriplex eximia, Cyclolepis genistoides, Echinopsis klingeriana, Grabowskia duplicata, Heterostachys ritteriana, Lophocarpinia aculiatifolia, Lycium ovalilobum, Monantochloa littoralis, Plectrocarpa tetracantha, Pterocaulon purpurascens, Sarcocornia perennis, Sesuvium portulacastrum*, among many others.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.Em. South American Lowlands Interior Brackish Marsh (D270)

Elcode: M738

\*Scientific Name: Chaco-Espinal Brackish Marsh Macrogroup

\*Common (Translated Scientific) Name: Chaco-Espinal Brackish Marsh Macrogroup

\*Colloquial Name: Chaco-Espinal Brackish Marsh

\*Type Concept: Hygro-halophilous shrub-, grass- or forb-dominated communities of the Chaco and the Espinal in depressions of fluvial or lacustrine origin, mostly in endorheic basins with an extended dry season, where salts accumulate after water evaporation. A sparse tree layer can occur with species of *Cereus*, an arborescent cacti, the palm *Copernicia alba*, and *Prosopis* spp. Among the herb species are *Allenrolfea patagonica, Atriplex eximia, Pterocaulon purpurascens, Echinopsis klingeriana, Lophocarpinia aculiatifolia, Sarcocornia perennis, Heterostachys ritteriana, Grabowskia duplicata, Cyclolepis genistoides, Sesuvium portulacastrum, Lycium ovalilobum, Monantochloa littoralis, Plectrocarpa tetracantha*, among many others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.En. Andean Salt Marsh

D271. Andean Salt Marsh

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.5.En. Salt Marsh (F035)

Elcode: D271

\*Scientific Name: Andean Salt Marsh Division

\*Common (Translated Scientific) Name: Andean Salt Marsh Division

\*Colloquial Name: Andean Salt Marsh

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M739 | Central Andean Altiplano Salt Flats |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.En. Andean Salt Marsh

M739. Central Andean Altiplano Salt Flats

Type Concept Sentence: Communities developed in the geomorphological playas of endorheic basins of the high Andean salt flats, especially in the vast, high plateau of the xeric Puna in Bolivia, Chile and Argentina and on volcanic ridges, approximately between 3500 and 4500 m elevation. They grow on clayish saline soils (solonetzs, solonchaks) that either flood seasonally with a shallow sheet of water or become waterlogged. Floristically, these communities are typically low in diversity and composed of endemic species. Characteristic species include *Anthobryum triandrum, Atriplex myriophylla, Atriplex nitrophiloides, Baccharis acaulis, Distichlis humilis, Hymenoxis robusta, Puccinellia hypsophila, Sarcocornia pulvinata, Suaeda foliosa*, and *Triglochin palustris*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.En. Andean Salt Marsh (D271)

Elcode: M739

\*Scientific Name: Central Andean Altiplano Salt Flats Macrogroup

\*Common (Translated Scientific) Name: Central Andean Altiplano Salt Flats Macrogroup

\*Colloquial Name: Central Andean Altiplano Salt Flats

\*Type Concept: Plant communities developed in the geomorphological playas of endorheic basins of the High Andean salt flats, especially in the vast high plateau of the xeric Puna in Bolivia, Chile and Argentina and on volcanic ridges, approximately between 3500 m and 4500 m altitude. They grow on clayish saline soils (solonetzs, solonchaks) which flood seasonally with a very shallow sheet of water or only get waterlogged. Floristically very endemic, but not so diverse, characteristic species are *Sarcocornia pulvinata, Anthobryum triandrum, Atriplex nitrophiloides, Distichlis humilis, Triglochin palustris, Atriplex myriophylla, Baccharis acaulis, Suaeda foliosa, Hymenoxis robusta, Puccinellia hypsophila*, among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Eo. South American Pacific Desert Salt Flats

D272. South American Pacific Desert Salt Flats

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.5.Eo. Salt Marsh (F035)

Elcode: D272

\*Scientific Name: South American Pacific Desert Salt Flats Division

\*Common (Translated Scientific) Name: South American Pacific Desert Salt Flats Division

\*Colloquial Name: South American Pacific Desert Salt Flats

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M740 | South American Pacific Desert Salt Flats |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Eo. South American Pacific Desert Salt Flats

M740. South American Pacific Desert Salt Flats

Type Concept Sentence: Short and sparse shrubland or steppe dominated by halophilous plants such as *Atriplex atacamensis, Atriplex madariagae*, and *Tessaria absinthioides*, under which develops an extensive grass layer formed by *Distichlis* sp. This community is associated with saline soils and desert oases, saline margins of streams, and edges of the salt flats of the Atacama Desert in northern Chile.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.Eo. South American Pacific Desert Salt Flats (D272)

Elcode: M740

\*Scientific Name: South American Pacific Desert Salt Flats Macrogroup

\*Common (Translated Scientific) Name: South American Pacific Desert Salt Flats Macrogroup

\*Colloquial Name: South American Pacific Desert Salt Flats

\*Type Concept: Short and sparse shrubland or steppe dominated by halophilous plants of *Atriplex atacamensis, Atriplex madariagae, Tessaria absinthioides*, under which develops an extensive grass layer formed by *Distichlis* sp. This community is associated with saline soils and desert oasis, saline margins of streams and edges of the salt flats of the Atacama Desert in northern Chile.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Ep. South American Temperate Salt Marsh

D285. South American Temperate Salt Marsh

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.5.Ep. Salt Marsh (F035)

Elcode: D285

\*Scientific Name: South American Temperate Salt Marsh Division

\*Common (Translated Scientific) Name: South American Temperate Salt Marsh Division

\*Colloquial Name: South American Temperate Salt Marsh

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BR, CL, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M762 | South American Temperate Interior Brackish Marsh |
| M763 | Temperate & Austral Atlantic Coastal Salt Marsh |
| M761 | Southern Andean Montane Salt Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Ep. South American Temperate Salt Marsh

M762. South American Temperate Interior Brackish Marsh

Type Concept Sentence: Hygro-halophilous communities of saline depressions, arroyo banks, and flooded alluvial fans of the semi-deserts of the Monte biogeographic region in Argentina. Also includes communities of the margins of saline endorheic basins of the Espinal and the semi-arid Pampa. Both occur under xeric conditions, though less extreme in the latter. These communities are dominated by *Distichlis scoparia, Distichlis spicata, Heterostachys ritteriana, Juncus acutus*, and *Spartina densiflora*. Common species of the hygro-halophilous communities of the Monte region include *Allenrolfea vaginata, Atriplex lampa, Atriplex rosea, Bassia hyssopifolia, Halophytum ameghinoi, Heterostachys ritteriana, Maytenus vitis-idaea, Plectrocarpa tetracantha, Prosopis sericantha, Sarcocornia perennis*, and *Suaeda divaricata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.Ep. South American Temperate Salt Marsh (D285)

Elcode: M762

\*Scientific Name: South American Temperate Interior Brackish Marsh Macrogroup

\*Common (Translated Scientific) Name: South American Temperate Interior Brackish Marsh Macrogroup

\*Colloquial Name: South American Temperate Interior Brackish Marsh

\*Type Concept: This macrogroup includes hygro-halophilous communities of saline depressions, arroyo banks and flooding alluvial fans of the semi-deserts of the Monte biogeographic region in Argentina. It also includes communities at the margins of depressions of saline endorheic basins of the Espinal and the semi-arid Pampa. Both occur under xeric conditions but with less extreme xeric conditions in the latter. These communities are dominated by *Distichlis scoparia, Distichlis spicata, Heterostachys ritteriana, Juncus acutus*, and *Spartina densiflora*. In contrast, for the hygro-halophilous communities of the Monte and northern Patagonia, common taxa are *Heterostachys ritteriana, Allenrolfea vaginata, Suaeda divaricata, Plectrocarpa tetracantha, Maytenus vitis-idaea, Prosopis sericantha, Atriplex lampa, Cortesia cuneifolia, Sarcocornia perennis (= Sarcocornia ambigua), Atriplex rosea, Bassia hyssopifolia*, and *Halophytum ameghinoi*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Ep. South American Temperate Salt Marsh

M763. Temperate & Austral Atlantic Coastal Salt Marsh

Type Concept Sentence: Herbaceous vegetation at the margins of coastal lagoons and in wet swales in the dune-and-swale complex, distributed along the coasts of southern Brazil, Uruguay, and Argentina. Extreme conditions characterize these environments, including strong winds, low nutrient availability and high salinity due to ocean spray and periodical input of ocean water. Characteristic species are *Baccharis juncea, Blutaparon portulacoides var. commersonii, Bolboschoenus maritimus, Calystegia soldanella, Carex vixdentata, Distichlis spicata, Heliotropium curassavicum, Juncus acutus ssp. leopoldii, Limonium brasiliense, Paspalum distichum, Phragmites australis*, and *Spartina* spp.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.Ep. South American Temperate Salt Marsh (D285)

Elcode: M763

\*Scientific Name: Temperate & Austral Atlantic Coastal Salt Marsh Macrogroup

\*Common (Translated Scientific) Name: Temperate & Austral Atlantic Coastal Salt Marsh Macrogroup

\*Colloquial Name: Temperate & Austral Atlantic Coastal Salt Marsh

\*Type Concept: This macrogroup represents the herbaceous vegetation at the margins of coastal lagoons and of the wet swales in the dune-and-swale complex, distributed in the coasts of southern Brazil, Uruguay, and Argentina. Communities are subject to extreme conditions characterizing this environments, such as strong winds, very low nutrient availability and salinity due to the ocean spray and periodic input of ocean water in the system. Characteristic species are *Baccharis juncea, Blutaparon portulacoides var. commersonii (= Iresine portulacoides), Bolboschoenus robustus, Bolboschoenus maritimus (= Scirpus maritimus), Calystegia soldanella, Carex vixdentata, Distichlis spicata, Heliotropium curassavicum, Juncus acutus ssp. leopoldii, Limonium brasiliense, Paspalum distichum, Phragmites australis*, and *Spartina* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Ep. South American Temperate Salt Marsh

M761. Southern Andean Montane Salt Marsh

Type Concept Sentence: Hygro-halophilous shrub-, grass- or forb-dominated communities of the Andean Altiplano of the southern extreme of Bolivia, central Chile and central-northwestern Argentina, growing between 1500-3200 m elevation. They develop on the margins of depressions of saline endorheic basins under xeric or desertic climates. Communities in the northern portion include *Atriplex atacamensis, Atriplex deserticola, Atriplex lampa, Lycium* sp., and *Suaeda foliosa*, and whereas those distributed farther south include *Atriplex patagonica, Distichlis caespitosa, Distichlis scoparia, Distichlis spicata, Heterostachys ritteriana, Nitrophila australis, Poa pugionifolia, Puccinellia* spp., *Sarcocornia perennis*, and *Suaeda divaricata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.Ep. South American Temperate Salt Marsh (D285)

Elcode: M761

\*Scientific Name: Southern Andean Montane Salt Marsh Macrogroup

\*Common (Translated Scientific) Name: Southern Andean Montane Salt Marsh Macrogroup

\*Colloquial Name: Southern Andean Montane Salt Marsh

\*Type Concept: Hygro-halophilous shrub-, grass- or forb-dominated communities of the Mediterranean Andes of the southern extreme of Bolivia, central Chile and central-northwestern Argentina, growing between 1500-3200 m asl. They develop in the edges or margins of depressions of saline endorheic basins under xeric or desertic climate. Communities in the northern portion include *Atriplex lampa, Atriplex deserticola, Atriplex atacamensis, Suaeda foliosa*, and *Lycium* sp., and those distributed farther south include *Heterostachys ritteriana, Atriplex patagonica, Suaeda divaricata, Sarcocornia perennis (= Salicornia ambigua), Distichlis scoparia, Distichlis spicata, Distichlis caespitosa, Poa pugionifolia, Nitrophila australis*, and *Puccinellia* spp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Na. North American Great Plains Saline Marsh

D033. North American Great Plains Saline Marsh

Type Concept Sentence: Brackish marsh and saline wet meadows found along shallow lakes and basins and surrounding areas across the Great Plains of North America.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.5.Na. Salt Marsh (F035)

Elcode: D033

\*Scientific Name: *Distichlis spicata - Hordeum jubatum* Great Plains Saline Marsh Division

\*Common (Translated Scientific) Name: Saltgrass - Foxtail Barley Great Plains Saline Marsh Division

\*Colloquial Name: North American Great Plains Saline Marsh

\*Type Concept: This division includes brackish shallow lakes, shallow-sloped basins and surrounding areas across the Great Plains of the United States and Canada. Soils are strongly saline and can have poor structure with salt encrustations on the surface of some examples of communities within this division. Communities are dominated by salt-tolerant and halophytic herbs. Common species include *Distichlis spicata* and *Hordeum jubatum*. Other common species include *Atriplex patula, Eleocharis* spp., *Poa arida, Puccinellia nuttalliana, Salicornia rubra, Schoenoplectus americanus, Bolboschoenus maritimus, Schoenoplectus pungens, Spartina* spp., *Sporobolus airoides, Suaeda calceoliformis*, and *Iva annua*. Sites in this division are intermittently to seasonally flooded. An increase in precipitation during exceptionally wet years can dilute the salt concentration in the soils which may allow for less salt-tolerant species such as *Pascopyrum smithii* to become dominant.

\*Diagnostic Characteristics: This division is characterized by strongly saline soils and the dominance of salt-tolerant, short to medium-tall graminoids. Diagnostic species include *Distichlis spicata* and *Hordeum jubatum*. Other common species include *Atriplex patula, Eleocharis* spp., *Poa arida, Puccinellia nuttalliana, Salicornia rubra, Schoenoplectus americanus, Bolboschoenus maritimus, Schoenoplectus pungens, Spartina* spp., *Sporobolus airoides, Suaeda calceoliformis*, and *Iva annua*.

\*Classification Comments: This type is similar to the freshwater marshes in the region and may resemble wet meadows and freshwater marshes in the region during years with exceptional precipitation, which tend to dilute or over-ride the effects of salinity.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D323 | Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland |  |
| D322 | Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland |  |
| D034 | North American Atlantic & Gulf Coastal Salt Marsh |  |
| D036 | North American Western Interior Brackish Marsh, Playa & Shrubland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Species richness in these brackish marshes is typically low. The vegetation is characterized by graminoids of short to medium stature. The density and species composition of the vegetation are related to the degree of salinity in the soil; locations with low soil salinity often have dense growth of the predominant graminoids, whereas high soil salinity results in clumped growth forms with a high percentage of exposed soil.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The predominant species in these are marsh are graminoids and include *Distichlis spicata, Eleocharis* spp., *Hordeum jubatum, Juncus arcticus ssp. littoralis (= Juncus balticus), Juncus torreyi, Lythrum alatum, Pascopyrum smithii, Poa arida, Polypogon monspeliensis* (introduced), *Schoenoplectus americanus, Bolboschoenus maritimus (= Schoenoplectus maritimus), Schoenoplectus pungens, Spartina* spp., *Sporobolus airoides*. Forbs include *Heliotropium curassavicum, Iva annua, Puccinellia nuttalliana, Salicornia rubra, Suaeda calceoliformis*, and *Symphyotrichum subulatum*. Woody species are infrequent but, when present, include *Atriplex canescens, Atriplex patula, Baccharis salicina*, and *Tamarix* spp.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Frequency and duration of inundation, in addition to degree of soil salinity, affect the density and species composition of the vegetation.

ENVIRONMENT

Environmental Description: *Climate:* The division occurs within two climate types (sensu Trewartha): Temperate Continental and Dry Steppe (semi-arid). As a result, there are distinct gradients of precipitation and temperate within the division. The precipitation gradient extends along an east-to-west axis, with an average annual precipitation of 1014 mm at Lawrence, Kansas, to 477.5 mm at Boise City, Oklahoma. The western extent of the region is subject to periodic, often severe, droughts. The temperature gradient follows a south-north gradient. The annual average temperature in the southern extent of the Division is 18.6°C (mean high of 25.7°C and a mean low 11.6°C) at San Angelo, Texas, to 3.1°C in Regina, Saskatchewan (a mean high of 18.9°C in July and a mean low of -14.7°C).

*Soils/substrate:* In lacustrine environments (e.g., playa lakes), clay soils provide a barrier for the rapid infiltration of water. In palustrine habitats, soils are derived from quaternary sediments deposited along stream channels and on terraces. Because these habitats occur in a semi-arid climate, evaporation rates are high, thus increasing salt concentration in the soil. The source of salts in most of the region is evaporites deposited during the Permian Period. These gypsum deposits are often interbedded with red sandstone and mudstone deposits. In some locales, large salt flats have developed (e.g., the Great Salt Plains in Oklahoma).

DISTRIBUTION

\*Geographic Range: This division is found throughout the eastern and western Great Plains of the United States ranging into bordering Canadian provinces.

Nations: CA, MX?, US

States/Provinces: CO, IL, KS, MB, MI, MN, MO, MT, ND, NE, OK, ON, QC, SD, SK, TX, WY

USFS Ecoregions (2007) [optional]: 251:C, 331:C, 332:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M077 | Great Plains Saline Wet Meadow & Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: W.J. Mitsch and J.G. Gosselink (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S. Menard and B. Hoagland

Acknowledgments [optional]:

Version Date: 12 Jan 2016

REFERENCES

\*References [Required if used in text]:

Baalman, R. J. 1965. Vegetation of the Salt Plains National Wildlife Refuge, Jet, Oklahoma. Unpublished Ph.D. dissertation, University of Oklahoma, Norman.

Barbour, M. G., T. Keeler-Wolf, and A. A. Schoenherr, editors. 2007a. Terrestrial vegetation of California, third edition. University of California Press, Berkeley.

Barbour, M. G., and W. D. Billings, editors. 2000. North American terrestrial vegetation. Second edition. Cambridge University Press, New York. 434 pp.

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Hoagland, B. W., and S. L. Collins. 1997. Heterogeneity in shortgrass prairie vegetation: The role of playa lakes. Journal of Vegetation Science 8:277-286.

Mitsch, W. J., and J. G. Gosselink. 2000. Wetlands. Third edition. John Wiley & Sons, Inc., New York. 920 pp.

Ortenberger, A. I., and R. D. Bird. 1933. The ecology of the western Oklahoma salt plains. Publications of the University of Oklahoma Biological Survey 5:49-64.

2. Shrub & Herb Vegetation

2.C.5.Na. North American Great Plains Saline Marsh

M077. Great Plains Saline Wet Meadow & Marsh

Type Concept Sentence: This macrogroup consists of graminoid-dominated saline shallow depressions and mudflats dominated by *Distichlis spicata, Hordeum jubatum, Pascopyrum smithii*, or *Salicornia rubra*, as well as other flood- and saline-tolerant species. It occurs throughout the Great Plains from southern Canada to the panhandle of Texas and west into the plains of Montana, Wyoming and Colorado.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.Na. North American Great Plains Saline Marsh (D033)

Elcode: M077

\*Scientific Name: Great Plains Saline Wet Meadow & Marsh Macrogroup

\*Common (Translated Scientific) Name: Great Plains Saline Wet Meadow & Marsh Macrogroup

\*Colloquial Name: Great Plains Saline Wet Meadow & Marsh

\*Type Concept: This macrogroup covers graminoid-dominated saline shallow depressions and mudflats found throughout the Great Plains. The most abundant species at a site typically include *Distichlis spicata* or *Hordeum jubatum*. Other common associates or dominants are *Atriplex patula, Eleocharis* spp., *Iva annua, Pascopyrum smithii, Poa arida, Puccinellia nuttalliana, Salicornia rubra, Bolboschoenus maritimus, Sporobolus airoides*, and *Suaeda calceoliformis*. Soils are saline and any standing water is brackish. This macrogroup occurs throughout the Great Plains from southern Canada to the panhandle of Texas and west into the plains of Montana, Wyoming and Colorado.

\*Diagnostic Characteristics: Sites in this macrogroup are intermittently to seasonally flooded, dominated by short to medium-tall graminoids, on saline soils.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M071 | Great Plains Marsh, Wet Meadow, Shrubland & Playa |  |
| M079 | North American Atlantic & Gulf Coastal Salt Marsh |  |
| M082 | Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Stands are dominated by short to medium-tall herbaceous species, usually graminoids.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This macrogroup is dominated by herbaceous, usually graminoid, species. The most abundant species include *Distichlis spicata* or *Hordeum jubatum*. Other common associates or dominants are *Atriplex patula, Eleocharis* spp., *Iva annua, Pascopyrum smithii, Poa arida, Puccinellia nuttalliana, Salicornia rubra, Bolboschoenus maritimus (= Schoenoplectus maritimus), Sporobolus airoides*, and *Suaeda calceoliformis*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Variations in water and salinity levels have a strong impact on this macrogroup. Abundant plant species within this macrogroup are tolerant of moderate salinity and periodic flooding. Increases in precipitation will prolong the flooding period and dilute salt concentrations, allowing other species to encroach.

ENVIRONMENT

Environmental Description: This macrogroup occurs in shallow basins and mudflats that have seasonal periodic flooding. Sites may dry out by the end of the growing season. Soils are saline and create brackish water. Salt brought to the surface by water that later evaporates may form crusts.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs throughout the Great Plains from southern Canada to the panhandle of Texas and west into the plains of Montana, Wyoming and Colorado. The eastern limit of this macrogroup is in western Minnesota, eastern Nebraska, northwestern Missouri, and eastern Kansas. Rare saline marshes in the southern and eastern Great Lakes area are also included in this macrogroup.

Nations: CA, MX?, US

States/Provinces: CO, IL, KS, MB?, MI, MN, MO, MT, ND, NE, OK, ON, QC, SD, SK, TX, WY

USFS Ecoregions (2007) [optional]: 251A:C?, 251B:CC, 251C:CP, 251F:CP, 331B:CC, 331C:CC, 331D:CC, 331E:CC, 331F:CC, 331G:CC, 331H:CP, 331I:CP, 332A:CC, 332B:CC, 332C:CC, 332D:CC, 332E:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G324 | Great Plains Saline Wet Meadow & Marsh |
| G534 | Western Great Plains Saline Wet Meadow |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: J. Drake

Acknowledgments [optional]:

Version Date: 15 Oct 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Nb. North American Atlantic & Gulf Coastal Salt Marsh

D034. North American Atlantic & Gulf Coastal Salt Marsh

Type Concept Sentence: This division comprises all regularly and irregularly flooded tidal marshes of the North Atlantic and Gulf coasts in North America, ranging from polyhaline (salt) marshes to mesohaline (brackish) marshes, dominated or characterized by an abundance of halophytic species, including *Distichlis spicata, Spartina alterniflora, Spartina patens*, and species of *Salicornia* and *Sarcocornia*.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.5.Nb. Salt Marsh (F035)

Elcode: D034

\*Scientific Name: *Spartina alterniflora - Spartina cynosuroides - Salicornia* spp. Atlantic & Gulf Coastal Salt Marsh Division

\*Common (Translated Scientific) Name: Smooth Cordgrass - Big Cordgrass - Saltwort species Atlantic & Gulf Coastal Salt Marsh Division

\*Colloquial Name: North American Atlantic & Gulf Coastal Salt Marsh

\*Type Concept: This division encompasses eastern North American tidal marshes along the Atlantic and Gulf coasts, ranging in halinity from salt to brackish, and in tidal regime from regularly twice-daily flooding on low marshes to irregularly flooded high marshes, as well as hypersaline pannes. It also includes saline inland prairie. *Distichlis spicata, Spartina alterniflora, Spartina patens*, and species of *Salicornia* and *Sarcocornia* are characteristic throughout the range. These species are present but less abundant in brackish marshes that occur along tidal rivershores or in other settings receiving freshwater mixing. Here, additional species include *Spartina cynosuroides, Schoenoplectus americanus, Typha angustifolia*, and others. Associated species vary across the north-to-south expanse of this division. Towards the north, common associates include *Juncus gerardii, Limonium carolinianum, Plantago maritima var. juncoides*, and *Triglochin maritima*. From the Chesapeake and mid-Atlantic south, *Batis maritima, Juncus roemerianus, Monanthochloe littoralis, Sesuvium portulacastrum, Spartina spartinae*, and *Typha domingensis* become increasingly common associates. Salt marshes and pannes are regularly to irregularly flooded by shallow polyhaline waters as a result of lunar, wind and storm tides. Brackish tidal marshes develop along estuaries where freshwater mixes with ocean saltwater moving up the estuary from the tidal force. Waters in brackish marshes are generally in the salinity range of 0.5-18 ppt, and the vegetation is subject to flooding from the twice-daily tides. This division ranges along the Atlantic Coast and Gulf of Mexico region from the New England states and the southern Maritime Provinces of Canada south to northern Mexico.

\*Diagnostic Characteristics: Herbaceous vegetation of the Atlantic and Gulf coasts of North America, characterized by halophytic or mesohalophytic species (*Spartina alterniflora, Spartina cynosuroides, Spartina patens, Spartina spartinae, Salicornia* spp., *Sarcocornia* spp.) subjected to regular or irregular tidal flooding.

\*Classification Comments: Salt marsh zonation has been long recognized and well-studied. The four groups in ~North American Atlantic & Gulf Coastal Salt Marsh Macrogroup (M079)$$, the sole macrogroup in this division, reflect these common salt marsh zones (low marsh, high marsh, brackish marsh, panne) [see, for example, Adam (1990) and Mendelssohn and McKee (2000)]. Brackish marshes are found within a tidal river, along the upland side of salt marshes where freshwater inputs modify the salinity, or even brackish conditions on tidal streams within a salt marsh. They typically have reduced cover of *Spartina patens* and increased cover of associated brackish marsh species such as *Amaranthus cannabinus, Polygonum* spp., *Schoenoplectus americanus*, and *Typha angustifolia*.

The Texas Saline Inland Prairie is added to the range of this division and ~Atlantic & Gulf Coastal Tidal Flat & Panne Group (G123)$$. There are both southeastern and southwestern warm temperate floristic patterns but the dominants are more southeastern. That is, *Borrichia frutescens, Spartina spartinae*, and *Sporobolus virginicus* are Gulf Coast saline. *Chloracantha spinosa* and *Helianthus ciliaris* are southwest saline.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D026 | Eastern North American Coastal Scrub & Herb Vegetation |  |
| D322 | Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland |  |
| D033 | North American Great Plains Saline Marsh | covers interior salt marshes and contains similar species to examples in North America. |
| D035 | Temperate & Boreal Pacific Coastal Salt Marsh | includes coastal and tidal estuaries along the Pacific Rim. |
| D187 | Arctic Coastal Salt Marsh |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This division is characterized by graminoids or forbs, with a notably simple structure, often forming large, even-height monotypic patches, especially where tidal flooding is regular. Marshes of mixed height, comprising graminoids and forbs, are often more characteristic in brackish settings. Shrubs may be interspersed, especially near the transition to upland or non-tidal vegetation, with graminoid cover remaining extensive below. Where present, shrub cover can range widely. Vegetation may also be very sparse on immediate shorelines and tidal flats.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Distichlis spicata, Spartina alterniflora, Spartina patens*, and species of *Salicornia* and *Sarcocornia* are characteristic throughout the range. These species are present but less abundant in brackish marshes that occur along tidal rivershores or in other settings receiving freshwater mixing. Here, additional species include *Schoenoplectus americanus, Spartina cynosuroides, Typha angustifolia, Typha domingensis*, and others. Associated species vary across the north-to-south expanse of this division. Towards the north, common associates include *Juncus arcticus, Juncus gerardii, Limonium carolinianum, Solidago sempervirens, Plantago maritima var. juncoides*, and *Triglochin maritima*. From the Chesapeake and mid-Atlantic south, *Batis maritima, Juncus roemerianus, Monanthochloe littoralis, Sesuvium portulacastrum, Spartina spartinae*, and *Typha domingensis* become increasingly common associates. Succulent genera *Sarcocornia* (e.g., *Sarcocornia pacifica*) and *Salicornia* (e.g., *Salicornia depressa (= Salicornia virginica), Salicornia bigelovii, Salicornia maritima*), as well as several grasses (which may be stunted), including *Spartina spartinae, Spartina alterniflora, Sporobolus virginicus*, and *Distichlis spicata*, characterize hypersaline pannes. Macroalgae such as *Ascophyllum nodosum* may be present (though sparse) particularly in the northern part of the division's range.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: Salt marshes and pannes are regularly to irregularly flooded by shallow polyhaline waters as a result of lunar, wind and storm tides. They generally develop on fine-grained sediments, but can develop over sands as well. Production exceeds decomposition, leading to the buildup of marsh peat. Pannes form in depressions that range from 2-30 cm lower than the elevation of the marsh. The depressions are regularly to irregularly flooded by tides, and as the water evaporates during low tide, the salinity concentration increases, forming "salt pannes." Substrate is soft, silty muck or peat of variable density. Brackish tidal marshes develop along estuaries where freshwater mixes with ocean saltwater moving up the estuary from the tidal force. They also occur near uplands where freshwater inputs reduce the salinity of the salt marsh. Waters in brackish marshes are generally in the salinity range of 0.5-18 ppt, and the vegetation is subject to flooding from the twice-daily tides. This division ranges along the Atlantic coast and Gulf of Mexico region from the New England states and the southern Maritime Provinces of Canada south to northern Mexico.

DISTRIBUTION

\*Geographic Range: This coastal salt marsh vegetation is found along the North American Atlantic and Gulf of Mexico coasts from the Bay of Fundy south to Texas and possibly northern Mexico.

Nations: BS, CA, CU, MX, US

States/Provinces: AL, CT, DC, DE, FL, GA, LA, MA, MD, ME, MS, MXTM?, NB, NC, NH, NJ, NS, NY, RI, SC, TX, VA

USFS Ecoregions (2007) [optional]: 211:C, 221:C, 231:C, 232:C, 255:C

Omernik Ecoregions L3, L4 [optional]: 8.1.7.59e:C, 8.1.7.59f:C, 8.1.7.59g:C, 8.1.8.82f:C, 8.1.8.82g:C, 8.5.1.63b:C, 8.5.1.63c:C, 8.5.1.63d:C, 8.5.1.63e:C, 8.5.1.63g:C, 8.5.1.63n:C, 8.5.2.73o:C, 8.5.3.75d:C, 8.5.3.75j:C, 8.5.3.75k:C, 8.5.3.75l:C, 8.5.4.84a:C, 8.5.4.84c:C, 9.5.1.34g:C, 9.5.1.34h:C, 9.5.1.34i:C

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M079 | North American Atlantic & Gulf Coastal Salt Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Estuarine Persistent Emergent Wetland | Cowardin et al. 1979 |  |
| = | High Marsh | Mendelssohn and McKee 2000 |  |
| > | High Marsh | Adams 1963 |  |
| ? | Salt Marsh | Rawinski 1984a | formerly Southern New England and Gulf of Maine Salt Marshes |
| > | Salt marsh ecosystem | Odum and Copeland 1974 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: P. Adam (1990)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S.C. Gawler, L.A. Sneddon and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 30 Dec 2015

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2. Shrub & Herb Vegetation

2.C.5.Nb. North American Atlantic & Gulf Coastal Salt Marsh

M079. North American Atlantic & Gulf Coastal Salt Marsh

Type Concept Sentence: This macrogroup comprises all regularly and irregularly flooded tidal marshes of the North Atlantic and Gulf coasts in North America, ranging from polyhaline (salt) marshes to mesohaline (brackish) marshes, dominated or characterized by an abundance of halophytic species, including *Distichlis spicata, Spartina alterniflora, Spartina patens*, and species of *Salicornia* and *Sarcocornia*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.Nb. North American Atlantic & Gulf Coastal Salt Marsh (D034)

Elcode: M079

\*Scientific Name: North American Atlantic & Gulf Coastal Salt Marsh Macrogroup

\*Common (Translated Scientific) Name: North American Atlantic & Gulf Coastal Salt Marsh Macrogroup

\*Colloquial Name: North American Atlantic & Gulf Coastal Salt Marsh

\*Type Concept: This macrogroup encompasses eastern North American tidal marshes along the Atlantic and Gulf coasts, ranging in halinity from salt to brackish, and in tidal regime from regularly twice-daily flooding on low marshes to irregularly flooded high marshes, as well as hypersaline pannes. It also includes saline inland prairie. *Distichlis spicata, Spartina alterniflora, Spartina patens*, and species of *Salicornia* and *Sarcocornia* are characteristic throughout the range. These species are present but less abundant in brackish marshes that occur along tidal rivershores or in other settings receiving freshwater mixing. Here, additional species include *Spartina cynosuroides, Schoenoplectus americanus, Typha angustifolia*, and others. Associated species vary across the north-to-south expanse of this macrogroup. Towards the north, common associates include *Juncus gerardii, Limonium carolinianum, Plantago maritima var. juncoides*, and *Triglochin maritima*. From the Chesapeake and mid-Atlantic south, *Batis maritima, Juncus roemerianus, Monanthochloe littoralis, Sesuvium portulacastrum, Spartina spartinae*, and *Typha domingensis* become increasingly common associates. Salt marshes and pannes are regularly to irregularly flooded by shallow polyhaline waters as a result of lunar, wind and storm tides. Brackish tidal marshes develop along estuaries where freshwater mixes with ocean saltwater moving up the estuary from the tidal force. Waters in brackish marshes are generally in the salinity range of 0.5-18 ppt, and the vegetation is subject to flooding from the twice-daily tides. This macrogroup ranges along the Atlantic Coast and Gulf of Mexico region from the New England states and the southern Maritime Provinces of Canada south to northern Mexico.

\*Diagnostic Characteristics: Herbaceous vegetation of the Atlantic coast of North America, characterized by halophytic or mesohalophytic species (*Spartina alterniflora, Spartina cynosuroides, Spartina patens, Spartina spartinae, Salicornia* spp., *Sarcocornia* spp.) subjected to regular or irregular tidal flooding.

\*Classification Comments: Salt marsh zonation has been long recognized and well-studied. The four groups in ~North American Atlantic & Gulf Coastal Salt Marsh Macrogroup (M079)$$ reflect these common salt marsh zones (low marsh, high marsh, brackish marsh, panne) [see, for example, Adam (1990) and Mendelssohn and McKee (2000)]. Brackish marshes are found within a tidal river, along the upland side of salt marshes where freshwater inputs modify the salinity, or even brackish conditions on tidal streams within a salt marsh. They typically have reduced cover of *Spartina patens* and increased cover of associated brackish marsh species such as *Amaranthus cannabinus, Polygonum* spp., *Schoenoplectus americanus*, and *Typha angustifolia*.

The Texas Saline Inland Prairie is added to the range of this macrogroup and ~Atlantic & Gulf Coastal Tidal Flat & Panne Group (G123)$$. There are both southeastern and southwestern warm temperate floristic patterns but the dominants are more southeastern. That is, *Borrichia frutescens, Spartina spartinae*, and *Sporobolus virginicus* are Gulf Coast saline. *Chloracantha spinosa* and *Helianthus ciliaris* are southwest saline.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M066 | Atlantic & Gulf Coastal Fresh-Oligohaline Tidal Marsh | is also tidally flooded but lacks halophytic species. |
| M077 | Great Plains Saline Wet Meadow & Marsh | is also characterized by halophytes, but is non-tidal and has no marine influence. |
| M735 | Tropical Western Atlantic-Caribbean Salt Marsh |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is characterized by graminoids or forbs, with a notably simple structure, often forming large, even-height monotypic patches, especially where tidal flooding is regular. Marshes of mixed height, comprising graminoids and forbs, are often more characteristic in brackish settings. Shrubs may be interspersed, especially near the transition to upland or non-tidal vegetation, with graminoid cover remaining extensive below. Where present, shrub cover can range widely. Vegetation may also be very sparse on immediate shorelines and tidal flats.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Distichlis spicata, Spartina alterniflora, Spartina patens*, and species of *Salicornia* and *Sarcocornia* are characteristic throughout the range. These species are present but less abundant in brackish marshes that occur along tidal rivershores or in other settings receiving freshwater mixing. Here, additional species include *Schoenoplectus americanus, Spartina cynosuroides, Typha angustifolia, Typha domingensis*, and others. Associated species vary across the north-to-south expanse of this macrogroup. Towards the north, common associates include *Juncus arcticus, Juncus gerardii, Limonium carolinianum, Solidago sempervirens, Plantago maritima var. juncoides*, and *Triglochin maritima*. From the Chesapeake and mid-Atlantic south, *Batis maritima, Juncus roemerianus, Monanthochloe littoralis, Sesuvium portulacastrum, Spartina spartinae*, and *Typha domingensis* become increasingly common associates. Succulent genera *Sarcocornia* (e.g., *Sarcocornia pacifica*) and *Salicornia* (e.g., *Salicornia depressa (= Salicornia virginica), Salicornia bigelovii, Salicornia maritima*), as well as several grasses (which may be stunted), including *Spartina spartinae, Spartina alterniflora, Sporobolus virginicus*, and *Distichlis spicata*, characterize hypersaline pannes. Macroalgae such as *Ascophyllum nodosum* may be present (though sparse) particularly in the northern part of the macrogroup's range.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Wave and ice-scour can have a significant influence on the year-to-year appearance of the vegetation, and also influences variations in physiognomy and composition along estuary reaches. High marshes develop in areas above mean high water that still receive tidal influence from lunar spring tides, wind tides, or storm tides. Storm tides often deposit sand on salt marsh surfaces where overwash breaches the barrier dune. Salt pannes are part of the shifting mosaic of plant communities of the salt marsh complex. They tend to occur more frequently on the high marsh, but are present in the low marsh as well. Pannes are variable in shape and likely variable in origin. Formation can result from ice-scouring or rafting flotsam that scrapes away or smothers existing vegetation, or from peat compaction, mosquito ditch levees, or tidal creekbank erosion that blocks or impedes drainage. Lack of vegetation decreases local sedimentation, which also maintains lower micro-relief (Redfield 1972).

ENVIRONMENT

Environmental Description: Salt marshes and pannes are regularly to irregularly flooded by shallow polyhaline waters as a result of lunar, wind and storm tides. They generally develop on fine-grained sediments, but can develop over sands as well. Production exceeds decomposition, leading to the buildup of marsh peat. Pannes form in depressions that range from 2-30 cm lower than the elevation of the marsh. The depressions are regularly to irregularly flooded by tides, and as the water evaporates during low tide, the salinity concentration increases, forming "salt pannes." Substrate is soft, silty muck or peat of variable density. Brackish tidal marshes develop along estuaries where freshwater mixes with ocean saltwater moving up the estuary from the tidal force. They also occur near uplands where freshwater inputs reduce the salinity of the salt marsh. Waters in brackish marshes are generally in the salinity range of 0.5-18 ppt, and the vegetation is subject to flooding from the twice-daily tides. This macrogroup ranges along the Atlantic coast and Gulf of Mexico region from the New England states and the southern Maritime Provinces of Canada south to northern Mexico.

DISTRIBUTION

\*Geographic Range: This vegetation is found along the North American Atlantic and Gulf of Mexico coasts from the Bay of Fundy south to Texas and possibly northern Mexico.

Nations: CA, MX, US

States/Provinces: AL, CT, DC, DE, FL, GA, LA, MA, MD, ME, MS, MXTM?, NB, NC, NH, NJ, NS, NY, RI, SC, TX, VA

USFS Ecoregions (2007) [optional]: 211Cb:CCC, 211Db:CCC, 211Dc:CCC, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232A:CC, 232C:CC, 232D:CC, 232E:CC, 232G:CC, 232H:CC, 232I:CC, 232L:CC, 255Da:CCC, 255Dc:CCC

Omernik Ecoregions L3, L4 [optional]: 8.1.7.59e:C, 8.1.7.59f:C, 8.1.7.59g:C, 8.1.8.82f:C, 8.1.8.82g:C, 8.5.1.63b:C, 8.5.1.63c:C, 8.5.1.63d:C, 8.5.1.63e:C, 8.5.1.63g:C, 8.5.1.63n:C, 8.5.2.73o:C, 8.5.3.75d:C, 8.5.3.75j:C, 8.5.3.75k:C, 8.5.3.75l:C, 8.5.4.84a:C, 8.5.4.84c:C, 9.5.1.34g:C, 9.5.1.34h:C, 9.5.1.34i:C

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G122 | Atlantic & Gulf Coastal Low Salt Marsh |
| G123 | Atlantic & Gulf Coastal Tidal Flat & Panne |
| G121 | Atlantic & Gulf Coastal High Salt Marsh |
| G120 | Atlantic & Gulf Coastal Brackish Salt Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Estuarine Persistent Emergent Wetland | Cowardin et al. 1979 |  |
| = | High Marsh | Mendelssohn and McKee 2000 |  |
| > | High Marsh | Adams 1963 |  |
| ? | Salt Marsh | Rawinski 1984a | formerly Southern New England and Gulf of Maine Salt Marshes |
| > | Salt marsh ecosystem | Odum and Copeland 1974 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: H.T. Odum and B.J. Copeland (1974)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S.C. Gawler and L.A. Sneddon

Acknowledgments [optional]:

Version Date: 20 May 2015

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2. Shrub & Herb Vegetation

2.C.5.Nc. Temperate & Boreal Pacific Coastal Salt Marsh

D035. Temperate & Boreal Pacific Coastal Salt Marsh

Type Concept Sentence: Intertidal salt marshes and adjacent brackish marshes dominated by salt-tolerant graminoid and succulent stem vegetation found on the coast of the Pacific Rim in temperate, boreal and arctic latitudes of western North America and eastern Asia.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.5.Nc. Salt Marsh (F035)

Elcode: D035

\*Scientific Name: *Sarcocornia pacifica - Carex lyngbyei - Jaumea carnosa* Temperate & Boreal Pacific Rim Coastal Salt Marsh Division

\*Common (Translated Scientific) Name: Pacific Swampfire - Lyngbye's Sedge - Marsh Jaumea Temperate & Boreal Pacific Rim Coastal Salt Marsh Division

\*Colloquial Name: Temperate & Boreal Pacific Coastal Salt Marsh

\*Type Concept: This division consists of the intertidal salt marshes and brackish marshes found on the coast of the Pacific Rim in temperate, boreal and arctic latitudes; in western North America, they extend from Alaska and Canada as far south as Baja California and the Sonoran coast along the Gulf of California of Mexico, including coastal marshes along the Colorado River Delta and other river deltas such as the Rio Yaqui; in eastern Asia, they are found along the coasts of China, Japan, Russia and Korea with limited marsh development. Dominant plant species change from north to south, but communities have many species in common. Vegetation ranges from very dense thickets with substantial organic substrate to open and sparse on mud and sand flats. North American boreal and arctic elements include *Carex lyngbyei, Carex ramenskii, Cochlearia officinalis, Hippuris tetraphylla, Honckenya peploides, Plantago maritima*, and *Puccinellia* spp. Mediterranean or subtropical elements include *Batis maritima, Grindelia stricta, Limonium californicum, Monanthochloe littoralis, Salicornia bigelovii, Suaeda taxifolia*, and *Suaeda esteroa*. Widespread elements occurring in 2 or more of the climatic zones include *Cuscuta salina, Distichlis spicata, Eleocharis palustris, Glaux maritima, Jaumea carnosa, Salicornia* spp., *Spergularia canadensis, Spergularia macrotheca*, and/or *Triglochin* spp. In western North America, salt marshes are primarily associated with estuaries or coastal lagoons, and are limited to bays, behind sand spits or other locations protected from wave action. The arctic marshes are influenced by ice, extreme low temperatures, positive water balance and numerous inflowing streams and can be considered brackish rather than saline.

\*Diagnostic Characteristics: Pacific Rim temperate and boreal coastal herbaceous, intertidal salt marshes and brackish marshes primarily associated with estuaries or coastal lagoons; salt marshes are limited to bays, behind sand spits or other locations protected from wave action. Strong diagnostics include *Sarcocornia pacifica, Jaumea carnosa*, and *Cuscuta salina*.

\*Classification Comments: California and Baja California (Mexico) coastal salt marshes have been extensively sampled by Peinado et al. (1994b, 1995b, 2008) and by California teams (summarized in Sawyer et al. 2009). Peinado et al. (1994b, 2007) view the California - Baja California portion of the north-south gradient as the *Spartinion foliosae, Salicomion bigelovii, Limonio-Frankenietea salinae* complex, separate from the boreal Pacific, arctic, and subtropical to tropical mangrove complexes. Some elements from the tropical mangrove complex, such as *Monanthochloe littoralis* and *Salicornia bigelovii*, occur in southern California salt marshes. More information is needed from Asian and Arctic salt marshes.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D027 | Pacific North American Coastal Scrub & Herb Vegetation |  |
| D031 | Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland | especially ~Vancouverian Lowland Marsh, Wet Meadow & Shrubland Macrogroup (M073)$$ which includes stands of somewhat brackish marshes with *Argentina anserina* and *Deschampsia cespitosa* alliances, often considered to be coastal salt marsh by some authors (Campbell 1986, Pickart 2006). |
| D034 | North American Atlantic & Gulf Coastal Salt Marsh | includes salt marshes along the Atlantic Rim. |
| D036 | North American Western Interior Brackish Marsh, Playa & Shrubland | includes non-coastal, interior salt marshes. |
| D187 | Arctic Coastal Salt Marsh |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Vegetation ranges from very dense thickets with substantial organic substrate to open and sparse on mud and sand flats.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Dominant plant species change from north to south, but communities have many species in common. Vegetation ranges from very dense thickets with substantial organic substrate to open and sparse on mud and sand flats. North American boreal and arctic elements include *Carex lyngbyei, Carex ramenskii, Cochlearia officinalis, Hippuris tetraphylla, Honckenya peploides, Plantago maritima*, and *Puccinellia* spp. Mediterranean or subtropical elements include *Batis maritima, Grindelia stricta, Limonium californicum, Monanthochloe littoralis (= Distichlis littoralis), Salicornia bigelovii, Suaeda taxifolia*, and *Suaeda esteroa*. Widespread elements occurring in 2 or more of the climatic zones include *Cuscuta salina (= Cuscuta pacifica), Distichlis spicata, Eleocharis palustris, Glaux maritima, Jaumea carnosa, Salicornia* spp., *Spergularia canadensis, Spergularia macrotheca*, and/or *Triglochin* spp. In western North America, salt marshes are primarily associated with estuaries or coastal lagoons, and are limited to bays, behind sand spits or other locations protected from wave action. The arctic marshes are influenced by ice, extreme low temperatures, positive water balance and numerous inflowing streams and can be considered brackish rather than saline. A number of key species are diagnostic of the division. These species are generally limited to the Pacific coast of North America, ranging widely up and down the coast, and include *Sarcocornia pacifica (= Salicornia pacifica), Jaumea carnosa*, and *Cuscuta salina*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Coastal salt marsh dynamics include large-scale natural processes such as extreme flooding or high-high tidal events (including tsunamis) with associated erosion and deposition. Small-patch processes include parasitic plant kills of host plants (*Cuscuta salina, Cordylanthus maritimus*) on multiple species, including *Distichlis* spp., *Sarcocornia* spp., and *Jaumea* spp. (Grewell et al. 2007). Invasive *Spartina alterniflora* and exotic *Spartina densiflora*, along with *Lepidium latifolium*, are among the new introduced plants of the Pacific salt marshes. They alter and strongly affect dynamics and tend to crowd out native species (Grewell et al. 2007).

ENVIRONMENT

Environmental Description: Stands are found in coastal lagoons, estuaries, bays, and river mouths with regular connection to seawater, tidal action, and erosion processes. The most extensive salt marshes exist in protected bays (San Diego, San Francisco, Humboldt Bay, California) where geologic subsidence has affected the topography. These larger marshes have a dendritic channel development, which facilitates a regular sequence of tidal drainage and wetting. Vegetation adjacent to channels tend to prefer higher disturbance and nutrient fluxes than interior portions of the marsh which are commonly monospecifically dominated by *Sarcocornia* spp. or rhizomatous graminoids or grasses. Upper (high) salt marshes tend to concentrate salts, with concentrations increasing from north to south. Northern upper or high marshes tend to have lower salinities resulting from regular flushing from precipitation or other freshwater sources, whereas southern marshes have higher salinities from warmer, drier climatic conditions.

*Climate:*  Köppen climatic zones are moist mid-latitude climates with mild winters (C). The majority of the distribution from southern California to Washington is considered Csb, but farther north into British Columbia and southeastern Alaska the climate is Cfb, transitioning into moist mid-latitude climates with cold winters (D), specifically Dfc in western Alaska.

*Soils/substrate:* Soils are muck and mud ranging from completely anaerobic to diurnally saturated.

*Biogeography:* Principal genera are distributed globally (*Sarcocornia*) or from Eurasia through North America (*Spartina*). *Jaumea* is endemic to the Americas.

DISTRIBUTION

\*Geographic Range: Pacific Rim tidal salt marshes in temperate and boreal latitudes of western North America and eastern Asia.

Nations: CA, CN, JP, KP, KR, MX, RU, US

States/Provinces: AK, BC, CA, MXBC, MXBS, MXSO, OR, WA

USFS Ecoregions (2007) [optional]: 242:C, 261:C, 263:C, M242:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]: 290 relevés from northern California to Baja California (Peinado et al. 1994b). Survey work in San Diego, Los Angeles, Ventura, Solano, Marin, Sonoma, and Humboldt counties, California, are summarized in Sawyer et al. (2009).

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]: Good supporting classification information from Baja through northern California; less work in Oregon, Washington, British Columbia, and Alaska.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M081 | North American Pacific Coastal Salt Marsh |
| M080 | Asian Pacific Salt Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | *Carici-Puccinellietea phryganodis* (arctic) | Knapp 1976 | This reflects the arctic portion of the Alaska distribution of the division but does not include the boreal or the Mediterranean climates of the gradient of salt marshes up and down the Pacific Coast. |
| > | *Puccinellietea nutkaensis* (boreal and temperate) | Knapp 1976 | Phytosociological class representing boreal and temperate southeastern Alaska to central Oregon distribution, does not represent the Mediterranean portions of the gradient. |
| > | *Spartinion foliosae, Salicomion bigelovii, Limonio-Frankenietea salinae* | Peinado et al. 1994b | This represents the Mediterranean California and northern Baja California distribution of the gradient. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M. Peinado et al. (1994b); W.J. Mitsch and J.G. Gosselink (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: T. Keeler-Wolf and G. Kittel

Acknowledgments [optional]: T. Keeler-Wolf thanks D. Faber-Langendoen and E. Muldavin.

Version Date: 28 Oct 2015

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2. Shrub & Herb Vegetation

2.C.5.Nc. Temperate & Boreal Pacific Coastal Salt Marsh

M081. North American Pacific Coastal Salt Marsh

Type Concept Sentence: This macrogroup consists of coastal intertidal salt marshes dominated by *Allenrolfea occidentalis, Batis maritima, Carex lyngbyei, Glaux maritima, Jaumea carnosa, Suaeda* spp., and/or *Salicornia depressa*, among many other species along the Pacific Coast of North America, spanning boreal salt marshes from Alaska to Baja California in Mexico.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.Nc. Temperate & Boreal Pacific Coastal Salt Marsh (D035)

Elcode: M081

\*Scientific Name: North American Pacific Coastal Salt Marsh Macrogroup

\*Common (Translated Scientific) Name: North American Pacific Coastal Salt Marsh Macrogroup

\*Colloquial Name: North American Pacific Coastal Salt Marsh

\*Type Concept: This macrogroup consists of the intertidal salt marshes and brackish marshes found throughout the North American Pacific Coast. Vegetation ranges from very dense thickets to open and sparse. Dominant plant species include *Batis maritima, Carex lyngbyei, Carex ramenskii, Distichlis spicata, Eleocharis palustris, Glaux maritima, Hippuris tetraphylla, Honckenya peploides, Hordeum brachyantherum, Jaumea carnosa, Juncus arcticus ssp. littoralis, Limonium californicum, Monanthochloe littoralis, Plantago macrocarpa, Puccinellia pumila, Salicornia depressa, Salicornia* spp., *Spergularia canadensis, Suaeda* spp., *Triglochin maritima*, and/or *Triglochin* spp. These marshes occur in bays, behind sand spits or other locations protected from wave action. In the Mediterranean region, the salt marshes are dominated by low shrubs, including *Salicornia depressa*.

\*Diagnostic Characteristics: In temperate and boreal salt marshes, the coastal herbaceous intertidal salt marshes and brackish marshes are primarily associated with estuaries or coastal lagoons; salt marshes are limited to bays, behind sand spits or other locations protected from wave action. In the Mediterranean region, the salt marshes are dominated by low shrubs (*Salicornia depressa*).

\*Classification Comments: According to M. Peinado (pers. comm. 2014), the concepts for ~North American Pacific Coastal Salt Marsh Macrogroup (M081)$$ and ~Temperate Pacific Salt Marsh Group (G499)$$ are too broad and do not distinguish floristic, ecological and zonal realities (including plant communities) of the salt marshes of the North American Pacific. From the coast of southeast temperate Alaska to southern California, salt marshes show three types of floristic and ecological zonation: Boreal, Temperate and Mediterranean.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M082 | Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Graminoid-dominated herbaceous wetlands flooded daily by saltwater tidal influx. May contain low scattered shrubs.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Dominant plant species change from north to south, but communities have many species in common which include *Carex lyngbyei, Distichlis spicata, Jaumea carnosa, Salicornia depressa (= Salicornia virginica)*, and *Salicornia* spp. High salt marsh and other short-inundation and regularly drying salt marsh or marsh-like settings can be dominated by *Allenrolfea occidentalis, Arthrocnemum subterminale, Cressa truxillensis, Distichlis spicata, Frankenia salina*, and/or *Glaux maritima*. Low marshes are located in areas that flood every day and are dominated by a variety of low-growing forbs and low to medium-height graminoids, especially *Carex lyngbyei, Carex ramenskii, Glaux maritima, Hippuris tetraphylla, Honckenya peploides, Puccinellia pumila, Salicornia depressa, Schoenoplectus americanus, Bolboschoenus maritimus (= Schoenoplectus maritimus), Spergularia canadensis*, and *Triglochin maritima*. High marshes are located in areas that flood infrequently and are dominated by medium-tall graminoids and low forbs, especially *Argentina egedii, Deschampsia cespitosa, Festuca rubra, Hordeum brachyantherum, Juncus arcticus ssp. littoralis (= Juncus balticus), Plantago macrocarpa, Poa eminens*, and *Symphyotrichum subspicatum (= Aster subspicatus)*. Transition zone (slightly brackish) marshes are often dominated by *Atriplex prostrata (= Atriplex triangularis), Cordylanthus* spp., *Juncus mexicanus, Lilaeopsis masonii, Phragmites* spp., *Schoenoplectus acutus*, and *Typha* spp. The invasive species *Lepidium latifolium* is a problem in many of these marshes. Rare plant species include *Cordylanthus maritimus ssp. maritimus*.

In the cool wet climates of northern British Columbia, marshes can be dominated by *Plantago maritima* and *Puccinellia pumila*. In the warm summer-dry climes of central California to Baja California and the Sonoran coast, marshes can be sparsely vegetated and are composed of halophytic species such as *Allenrolfea occidentalis, Arthrocnemum subterminale, Atriplex* spp., *Distichlis spicata, Frankenia* spp., *Limonium californicum, Monanthochloe littoralis, Pluchea* spp., *Salicornia* spp., *Salicornia depressa*, and *Suaeda* spp. Floristic data were compiled from Shreve and Wiggins (1964), Sparks et al. (1977), Brown (1982a), Barbour and Major (1988), National Wetlands Working Group (1988), Viereck et al. (1992), Holland and Keil (1995), Sawyer and T. Keeler-Wolf (1995), and Boggs (2000).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: *Climate:* Ranges from temperate to Mediterranean to warm desert. *Soil/substrate/hydrology:* The frequency of tidal flooding and salinity vary widely. Soils are usually fine-textured and saturated. Primarily associated with estuaries or coastal lagoons, salt marshes are limited to bays, behind sand spits or other locations protected from wave action. These marshes form when there is a freshwater source that mixes with coastal ocean saltwater. Summer-dry periods result in decreased freshwater inputs from inland. Hypersaline environments within salt marshes occur in "salt pans" where tidal water collects and evaporates, and the vegetation can be sparse. Substrates are typically fine-textured and saline alluvium. Vegetation ranges from very dense thickets to open and sparse. Sharp gradients and abrupt shifts in species composition across complex moisture and salinity gradients make for fine-scale patches or bands of vegetation.

Gradients in elevation influence gradients in moisture and in salinity, with highest portions being drier and having higher surface concentrations of salt. Tidal fluctuation is very important and maintains constant moderate salinity and moisture conditions. Low marshes are located in areas that flood every day, while high marshes may only have water during periodic high tides. Environmental data were compiled from Shreve and Wiggins (1964), Sparks et al. (1977), Brown (1982), Barbour and Major (1988), National Wetlands Working Group (1988), Viereck et al. (1992), Holland and Keil (1995), Sawyer and T. Keeler-Wolf (1995), and Boggs (2000).

DISTRIBUTION

\*Geographic Range: This macrogroup occurs from Kodiak Island and south-central Alaska, south along the Pacific Coast throughout British Columbia, Washington, Oregon, California, Baja California and the Sonoran coast along the Gulf of California, including coastal marshes along the Colorado River delta and other river deltas such as the Rio Yaqui.

Nations: CA, MX, US

States/Provinces: AK, BC, CA, MXBC, MXBS, MXSO, OR, WA

USFS Ecoregions (2007) [optional]: 242A:CC, 261B:CC, 263A:CC, M242A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G499 | Temperate Pacific Salt Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Wetlands (217) | Shiflet 1994 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel, K. Boggs, and C. Chappell

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland

D036. North American Western Interior Brackish Marsh, Playa & Shrubland

Type Concept Sentence: Interior saline-alkaline wetlands of North American interior west, including salt flats, marshes and seeps, whose species composition is driven by water chemistry and duration and seasonality of wetness. Stands range from sparse cover of shrubs and/or herbs to productive marshes dominated by tall emergent graminoids.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.5.Nd. Salt Marsh (F035)

Elcode: D036

\*Scientific Name: *Sarcobatus vermiculatus - Allenrolfea occidentalis - Schoenoplectus americanus* North American Interior Brackish Marsh, Playa & Shrubland Division

\*Common (Translated Scientific) Name: Greasewood - Iodinebush - Chairmaker's Bulrush North American Interior Brackish Marsh, Playa & Shrubland Division

\*Colloquial Name: North American Western Interior Brackish Marsh, Playa & Shrubland

\*Type Concept: This division covers non-tidal interior saline-alkaline wetlands, salt flats, lower basins, marshes and seeps that occur throughout much of interior temperate to subtropical North America from Oregon, eastern Washington, and southern British Columbia across the intermountain basins, eastward through the Great Plains and from southern and central California and adjacent Baja California, Mexico, through the warm deserts of North America to Texas. Stands may occur near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. They may also occur at the interior edge of coastal salt marshes along the southwestern portion of the Pacific Coast where relatively low rainfall and high evaporation tends to concentrate salts near the surface. In general, key taxa are divided into two groups: halophytes of substrates with higher salt concentrations and salt-tolerant marsh plants. Halophytes include various woody and herbaceous members of the Chenopodiaceae which either store water in stems or leaves or exude excess salt from glands on leaves, and also include some members of the Asteraceae such as the *Isocoma acradenia-Isocoma arguta-Isocoma rusbyi* complex. The brackish marsh key species *Schoenoplectus americanus* is an excellent disperser and is regularly found in most stands throughout the range of the division. *Allenrolfea occidentalis* is a strong diagnostic species covering the southwestern portion of the extent of the division. It overlaps with *Sarcobatus vermiculatus*, which covers the northern and western portion of the division's distribution.

The climate of most stands is characterized by long periods of drought during the summer months. Maximum or minimum temperatures range widely from well over 45°C to well below 0°C. Coastal fringes of the desert or semi-desert in southern California south to central Baja California, Mexico, have mild temperatures, but may have very high evaporation. Many of the key species of shrubs or wetland herbs have broad distributions and have broad temperature tolerance. Salinity ranges from brackish to hypersaline. Texture ranges from peat and muck in perennial wetlands to heavy clay soils in and around playas or uplifted sea or lake beds in interior basins and valleys. Most soils are fine-textured and many have mineral crusts. Hydrology varies from permanent stream and spring flow to highly episodic flooding along desert streams and playa basins. Many stands of halophytic shrubs have fluctuating saline water tables.

\*Diagnostic Characteristics: Key species are restricted to non-tidal, salt-tolerant shrublands or herbaceous wetlands of permanent brackish marshes, seasonally or intermittently wet playas, lake margins, and closed basins. This division contains several related taxa, which taken together taxonomically are key taxa being largely restricted, widespread, and often dominant. These include the *Schoenoplectus americanus - Schoenoplectus pungens* complex, *Sarcobatus vermiculatus - Sarcobatus baileyi* complex, *Suaeda calceoliformis - Suaeda moquinii* complex, and the *Salicornia rubra-Salicornia depressa* complex. *Distichlis spicata*, although common and ubiquitous, is a moderate diagnostic because it occurs in a number of divisions.

\*Classification Comments: Distinction between this division and the Great Plains saline marshes needs careful review. Non-coastal and non-tidal salt marshes and shrublands become alkaline to saline by evapotranspiration strongly exceeding precipitation. The classification concept of this division emphasizes the broad adaptations of halophytic vegetation to variations in salinity and in moisture availability. Most of the diagnostic species of this division are widespread halophytes in North America and may actually be treated more broadly to include a circumboreal or hemispheric distribution (e.g., as is suggested for some species of *Eleocharis, Salicornia, Schoenoplectus*, etc. in Flora of North America (FNA Editorial Committee 2002b).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D033 | North American Great Plains Saline Marsh | There are potentially strong enough overlaps in composition to make the distinction between these two divisions very problematic. |
| D035 | Temperate & Boreal Pacific Coastal Salt Marsh | includes coastal and tidal estuaries. These divisions blur in central and south coastal California southward into Mexico where the lower annual precipitation and higher evaporation rates of upper coastal salt marshes tend to foster conditions appropriate for interior salt marsh vegetation. |
| D040 | Western North American Cool Semi-Desert Scrub & Grassland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Stands are variable depending upon degree of perennial to seasonal saturation or flooding, and degree of salinity/alkalinity of substrates. Of the true halophytes, *Allenrolfea occidentalis* alliance stands have the highest tolerance for salt, followed by *Sarcocornia utahensis, Sarcobatus vermiculatus*, and *Atriplex nuttallii* (Goodman 1973).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Sites exhibit a range of soil moisture and salinity/alkalinity, from slightly brackish perennial springs to rarely inundated, hypersaline evaporate crusts. Areas with higher water tables and lower salinity support productive brackish marshes with tall graminoids and grasses such as *Schoenoplectus americanus*, including the ecologically similar *Schoenoplectus pungens* *sensu* FNA Editorial Committee (2002b), *Phragmites australis, Typha angustifolia, Eleocharis* spp., and *Bolboschoenus maritimus* along with taller forbs such as *Helianthus nuttallii, Solidago spectabilis*, and *Euthamia occidentalis*. West of the Great Plains these occur where freshwater springs emerge through salty or alkaline substrate, or creeks, streams or rivers flow through edges of salt flats or coastal salt marshes. These marshes tend to have steep moisture gradients to drier adjacent saline vegetation of the seasonal or ephemeral wetland component of this division.

Seasonal or ephemeral wetlands in the division have saline soils, a shallow to moderately deep water table and flood intermittently, but remain dry for most growing seasons. Salt crusts are common throughout. The flats are intermittently, seasonally to semipermanently flooded, usually retaining subsurface water into the growing season and drying completely only in drought years. They are often found in strongly saline-alkaline playa-like depressions, old lakebeds or in floodplains of major river systems where seasonal water inputs are limited, and often include some groundwater seepage in a matrix of mixed salt desert scrub. High rates of evaporation lead to alkaline water and soil conditions, with layers of salt-encrusted soils often accumulating near seeps. Perennial seeps often have bands of distinctive vegetation radiating outward, each with lower moisture requirements and higher salinity tolerance; for example, *Anemopsis californica, Cressa truxillensis, Juncus cooperi, Juncus arcticus ssp. littoralis (= Juncus balticus), Bassia americana (= Kochia americana), Leymus triticoides, Leymus cinereus, Muhlenbergia asperifolia, Puccinellia* spp. (including the endemic *Puccinellia howellii*), *Salicornia rubra, Sesuvium verrucosum, Spartina gracilis, Sporobolus airoides*, and *Triglochin maritima*. These herb stands also are reduced in stature as they decrease in moisture and increase in salinity, and ultimately are often surrounded by a low patchy turf of *Distichlis spicata*. These herbaceous stands grade into seasonal or ephemeral wetlands on playas or salt pannes, or irregularly flooded lowlands where halophytic shrubs, tend to be characteristic. Occasional shrubs tolerant of brackish but not highly salty water may occur in and adjacent to these herbaceous wetlands. These include *Prosopis glandulosa, Prosopis pubescens*, and *Pluchea sericea* (larger stands of these species occur in other riparian divisions).

Brackish marshes from the Great Plains eastward share many of these same species but also include related species such as *Atriplex patula, Poa arida, Iva annua, Suaeda calceoliformis*, and tend to grade into surrounding grasslands or agricultural landscapes. An increase in precipitation during exceptionally wet years can dilute the salt concentration in the soils, allowing for less salt-tolerant species such as *Pascopyrum smithii* or *Hordeum jubatum* to become dominant. In general there are no highly evaporative hypersaline playas or flats east of the 100th meridian.

Shrublands characteristic of salty warm or cool desert conditions are prevalent in this division throughout the West, but are not common from the Great Plains eastward. These periodically flooded shrublands consist of open to moderately dense stands of woody chenopods. Soils with shallow briny water tables tend to be dominated or codominated by succulent phreatophytes, including *Allenrolfea occidentalis, Arthrocnemum subterminale, Sarcobatus vermiculatus*, or *Suaeda moquinii (= Suaeda nigra)*. Less salty soils with lower or no appreciable water table tend to have non-succulent-leaved species such as *Atriplex canescens, Atriplex confertifolia, Atriplex gardneri, Atriplex parryi, Atriplex spinifera, Grayia spinosa*, or *Krascheninnikovia lanata*. Areas of overlap occur with herbs such as *Distichlis spicata, Bassia americana*, and short perennial subshrubs such as *Suaeda* spp. and *Frankenia salina* (in California) occurring with taller shrubs of *Atriplex* or *Sarcobatus*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Temporal shifts in salinity, inundation, and soil moisture strongly affect the dynamics of both herbaceous and woody components of this division. Although most western stands are subject to long periods of drought and are relatively stable in salinity, the more eastward and northward in range, the more likely are shifts in salinity based on periods of drought (higher) or wet cycles (lower). Permanent springs and seeps may also be affected by increases or decreases in salinity. In California, stands of *Atriplex spinifera, Atriplex confertifolia, Suaeda moquinii*, and other shrubs tend to be short-lived and shift depending on drought cycles (Sawyer et al. 2009). Others have found similar drought-related cycles in *Allenrolfea* or *Sarcobatus* (Trent et al. 1997, Gul et al. 2001).

ENVIRONMENT

Environmental Description: *Climate:* Most stands are characterized by long periods of drought during the summer months. Maximum or minimum temperatures range widely from well over 45°C to well below 0°C. Coastal fringes of the desert or semi-desert in southern California south to central Baja California, Mexico, have mild temperatures, but may have very high evaporation. Many of the key species of shrubs or wetland herbs have broad distributions and have broad temperature tolerance. Köppen climate system classifies the general distribution of this division within the Dry Climates (B) and include Bwh in subtropical Sonoran Desert ranging to Bsk in the northern Great Basin and the edges of the Great Plains. Large areas of the Great Basin are also Bwk.

*Soil/substrate/hydrology:* Salinity ranges from brackish to hypersaline. Texture ranges from peat and muck in perennial wetlands to heavy clay soils in and around playas or uplifted sea or lake beds in interior basins and valleys. Most soils are fine-textured and many have mineral crusts. Hydrology varies from permanent stream and spring flow to highly episodic flooding along desert streams and playa basins. Many stands of halophytic shrubs have fluctuating saline water tables.

*Biogeography:* Some of the diagnostic species for this division are members of very widely distributed genera (e.g., *Suaeda*). Species of *Salicornia* are found in both the Americas and Eurasia and Africa. *Allenrolfea* (a monotypic genus) is only in the New World. *Sarcobatus* is endemic to western North America. The marsh herbaceous genera are widespread in the Northern Hemisphere and some, such as *Schoenoplectus*, are distributed throughout the temperate and tropical zones of the world.

DISTRIBUTION

\*Geographic Range: This type occurs throughout much of the western U.S. in intermountain basins and extends onto the western Great Plains, into central Montana and into the warm deserts of North America, throughout California's Central Valley, San Joaquin Valley, and along its south coast extending into Baja California Norte, Mexico. The type is poorly developed eastward in the Great Plains primarily due to the dilution effect of higher summer rainfall and concomitant low evaporative conditions in the eastern part of North America.

Nations: CA, MX, US

States/Provinces: AZ, CA, CO, ID, MT, MXBC, MXCH, MXSO, NM, NV, OR, TX, UT, WA, WY

USFS Ecoregions (2007) [optional]: 261:C, 262:C, 313:C, 315:C, 321:?, 322:C, 331:C, 341:C, 342:C, M242:?, M261:C, M313:C, M331:C, M332:C, M341:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]: Salt tolerance along environmental gradients in Utah have been studied (Goodman 1973, Hansen 1975) showing a predictable gradation in species presence and dominance from high to lower salt tolerance. Peinado et al. (1994b) have sampled coastal and interior marshes in California and Baja California (Mexico) and shown ecological relationships between associations and alliances. Sampling and ecological distinction of the variety of associations and alliances in this division have been conducted in several California studies. Evens et al. (2014) have summarized these for the Mojave Desert and Buck et al. (2012) have summarized for the Sacramento and San Joaquin Valley area.

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: The conceptual split between permanent brackish wetlands and salt desert scrub is large and invites further exploration ecologically. This division-level concept emphasizes the dynamic relationships within salty wetlands in inland arid western North America and underscores the need to identify wetlands in the traditional sense (wet and productive during the growing season) ,as well as in the less familiar functional and ecological sense within the naturally highly episodic nature of western interior processes.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M082 | Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Alkali Sink | Keeler-Wolf 2007 | Keeler-Wolf only discusses Mojave Desert Alkali Sink which largely excludes *Sarcobatus* of the Great Basin, but does include brackish and saline marshes with *Allenrolfea* and *Suaeda* saline shrublands. |
| > | Mohavean Interior Marshland | Brown et al. 1980 | Only includes the wetland herbaceous alliances, does not treat the halophytic woody vegetation. |
| > | Saltbush series (as part of Great Basin Desert Scrub) | Brown et al. 1980 | Divide Saltbush series elements between cold-temperate Great Basin Desert Scrub, and warm-temperate desert lands in Mojave, Chihuahuan, and Sonoran desert scrubs, replicating the same relationships within 4 different regional formations. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M.G. Barbour and W.D. Billings (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel and T. Keeler-Wolf

Acknowledgments [optional]: T. Keeler-Wolf thanks D. Faber-Langendoen and E, Muldavin for fruitful discussions and G. Kittel for editorial refinements.

Version Date: 28 Oct 2015

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2. Shrub & Herb Vegetation

2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland

M082. Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland

Type Concept Sentence: This macrogroup consists of alkaline and saline wetlands with salt-tolerant plant growth where dominant and characteristic plant species include *Atriplex* spp., *Distichlis spicata, Salicornia* spp., *Sarcobatus vermiculatus, Sesuvium verrucosum, Sporobolus* spp., *Suaeda moquinii*, and *Triglochin maritima*. These are located in playas, washes, mudflats and depressional wetlands where evaporation far exceeds precipitation and/or where bedrock and soil properties contribute to alkaline/saline conditions. Sites are found throughout the western U.S. and southwestern Canada.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.Nd. North American Western Interior Brackish Marsh, Playa & Shrubland (D036)

Elcode: M082

\*Scientific Name: Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland Macrogroup

\*Colloquial Name: Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland

\*Type Concept: This macrogroup consists of alkaline and saline wetlands dominated by salt-tolerant shrubs or herbs (or both) such as *Allenrolfea occidentalis, Artemisia tridentata, Atriplex* spp., *Distichlis spicata, Eleocharis* spp., *Juncus* spp., *Isocoma acradenia, Grayia spinosa, Krascheninnikovia lanata, Leymus cinereus, Leymus triticoides, Salicornia* spp., *Sarcobatus vermiculatus, Sesuvium verrucosum, Sporobolus airoides, Suaeda moquinii*, and/or *Triglochin maritima*. These wetlands occur near drainages, on stream terraces or flats and may form rings around drying ponds or playas. Soils are alkaline to saline that varies greatly with soil moisture and greatly affects species composition. Sites also experience intermittent, seasonal or semipermanent flooding and/or raised water tables. Sites may retain water into the growing season and dry completely only in drought years, while others dry out for the growing season. Some sites have seasonal drying that exposes mudflats which are colonized by annual wetland vegetation. Sites are found throughout the western U.S. and southwestern Canada.

\*Diagnostic Characteristics: Salt-tolerant shrublands or herbaceous vegetation with a shallow water table.

\*Classification Comments: All interior alkaline/saline wetlands are together in one macrogroup. *Andropogon glomeratus, Distichlis spicata, Eleocharis rostellata, Muhlenbergia utilis, Schoenus nigricans, Solidago spectabilis var. confinis*, and *Solidago spectabilis var. spectabilis* along with a variety of other forbs occur in sites with alkaline springs in eastern California (Evens et al. 2014). These stands are placed in this macrogroup until further data compilation and analysis occur.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M888 | Arid West Interior Freshwater Marsh |  |
| M077 | Great Plains Saline Wet Meadow & Marsh |  |
| M081 | North American Pacific Coastal Salt Marsh |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Open shrub and/or herbaceous vegetation.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Shrublands are dominated by *Allenrolfea occidentalis, Atriplex canescens, Atriplex confertifolia, Atriplex gardneri, Atriplex parryi, Grayia spinosa, Isocoma acradenia, Krascheninnikovia lanata, Sarcobatus vermiculatus*, and/or *Suaeda moquinii*. Herbaceous stands may be dominated by *Calamovilfa longifolia, Distichlis spicata (= Distichlis stricta), Eleocharis palustris, Leymus cinereus, Leymus triticoides (= Elymus triticoides), Eleocharis palustris, Juncus cooperi, Juncus mexicanus, Muhlenbergia* spp., *Poa secunda, Puccinellia lemmonii, Puccinellia nuttalliana, Sarcocornia utahensis, Sporobolus airoides, Suaeda moquinii (= Suaeda nigra)*, and/or *Triglochin maritima* (West 1983b, Knight 1994). During exceptionally wet years, increased precipitation can dilute soil salt concentrations which may allow less salt-tolerant species to become established or more abundant.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: During exceptionally wet years, the salt concentration drops, allowing less salt-tolerant species to appear, such as cattails (*Typha* spp.) or bulrushes (*Scirpus* and/or *Schoenoplectus* spp.) (Knight 1994). Water evaporation leaves high salt concentrations in the soils. Some areas only flood during wet years, sometimes only once or twice in a decade. Others will have standing water every spring, except in the driest of years.

ENVIRONMENT

Environmental Description: *Climate:* Cold or warm basins and desert. *Soil/substrate/hydrology:* Sites typically have saline/alkaline soils, a shallow water table and flood or high water table intermittently, seasonally to semipermanently. Sites may remain dry for most growing seasons, or remain wet due to poor drainage. The water table generally remains high enough to maintain vegetation, despite salt accumulations (West 1983b, Knight 1994). Some stands occur on floodplains, along the margins of perennial lakes, and in alkaline closed basins, with extremely low-gradient shorelines, and slopes with alkaline springs. Environmental information compiled from individual associations and Knight (1994).

DISTRIBUTION

\*Geographic Range: This macrogroup is found throughout much of the western U.S. in intermountain basins and in southwestern Canada.

Nations: CA, MX, US

States/Provinces: AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]: 313A:CC, 313B:CC, 313D:CC, 315A:CC, 315H:CC, 321A:??, 322A:CC, 331B:CC, 331C:CP, 331D:CP, 331F:CC, 331G:CC, 331H:CC, 331I:CC, 331J:CC, 331K:CP, 331L:C?, 341A:CC, 341B:CC, 341C:CC, 341D:CC, 341E:CC, 341F:CC, 341G:CC, 342A:CC, 342B:CC, 342C:CC, 342D:CC, 342E:CP, 342F:CC, 342G:CC, 342H:CC, 342I:C?, 342J:CC, M242C:CC, M261D:CC, M261E:CP, M261G:CC, M313A:CC, M313B:CC, M331A:C?, M331B:CP, M331D:CC, M331E:CC, M331F:CC, M331G:CC, M331H:CC, M331I:CP, M331J:C?, M332A:C?, M332D:CP, M332E:C?, M332G:CC, M341A:CC, M341B:CC, M341C:CC, M341D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G538 | North American Desert Alkaline-Saline Marsh & Playa |
| G537 | North American Desert Alkaline-Saline Wet Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-06-02 | M090 North American Warm Desert Alkaline-Saline Semi-Desert Scrub Macrogroup | M090 merged into M083 (7-25-12); subsequently M083 merged into M082 |
| 2014-06-02 | M083 Warm Semi-Desert & Mediterranean Alkaline-Saline Wetland & Playa Macrogroup | M083 merged into M082 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Salt Desert Shrub (414) | Shiflet 1994 |  |
| >< | Saltbush - Greasewood (501) | Shiflet 1994 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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2. Shrub & Herb Vegetation

2.C.5.Ue. Tropical Atlantic Coastal Salt Marsh

D037. Tropical Atlantic Coastal Salt Marsh

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 2.C.5.Ue. Salt Marsh (F035)

Elcode: D037

\*Scientific Name: Tropical Atlantic Coastal Salt Marsh Division

\*Common (Translated Scientific) Name: Tropical Atlantic Coastal Salt Marsh Division

\*Colloquial Name: Tropical Atlantic Coastal Salt Marsh

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR, BS, CO, CU, DO, GY, JM, MQ, PR, SR, US, VE, XC

States/Provinces: FL

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M735 | Tropical Western Atlantic-Caribbean Salt Marsh |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

2. Shrub & Herb Vegetation

2.C.5.Ue. Tropical Atlantic Coastal Salt Marsh

M735. Tropical Western Atlantic-Caribbean Salt Marsh

Type Concept Sentence: This macrogroup comprises all regularly and irregularly flooded tidal marshes of the tropical western Atlantic and Caribbean coasts, ranging from polyhaline (salt) marshes to mesohaline (brackish) marshes, dominated or characterized by an abundance of halophytic species, typically including dwarf evergreen shrubs *Batis maritima, Cryptocarpus pyriformis, Rachicallis americana*, and graminoids *Cyperus laevigatus, Distichlis spicata, Paspalum vaginatum, Sporobolus virginicus*, and *Spartina alterniflora*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 2.C.5.Ue. Tropical Atlantic Coastal Salt Marsh (D037)

Elcode: M735

\*Scientific Name: *Spartina alterniflora - Batis maritima - Sesuvium portulacastrum* Salt Marsh Macrogroup

\*Common (Translated Scientific) Name: Smooth Cordgrass - Turtleweed - Shoreline Sea-purslane Salt Marsh Macrogroup

\*Colloquial Name: Tropical Western Atlantic-Caribbean Salt Marsh

\*Type Concept: This macrogroup comprises all regularly and irregularly flooded tidal marshes of the tropical western Atlantic and Caribbean coasts, ranging from polyhaline (salt) marshes to mesohaline (brackish) marshes, often associated with mangroves. The macrogroup also includes communities found in semipermanently flooded coastal ponds or lagoons, or tidally flooded salt flats, as well as sand and mudflats behind barrier beaches. The vegetation is dominated or characterized by an abundance of halophytic species, including grasses, sedges, low shrubs or succulents. Dominant graminoids include *Cyperus laevigatus, Cyperus ligularis, Distichlis spicata, Paspalum vaginatum, Sporobolus virginicus, Juncus roemerianus*, and *Spartina alterniflora*. Succulent herbs include *Alternanthera maritima, Blutaparon portulacoides, Blutaparon vermiculare*, and *Sesuvium portulacastrum*. Halophytic shrubs include *Atriplex cristata, Batis maritima, Cryptocarpus pyriformis*, and *Salicornia "virginica"* s.l. (*Salicornia "fruticosa"* s.l.). Salt marsh shrub thickets are dominated by *Hibiscus tiliaceus*, forming an often dense belt of thickets immediately inland from mangrove formations of the Brazilian and Guianan coasts. Essentially monospecific communities of mud and salt flats dominated by *Batis maritima* are also included in this macrogroup.

\*Diagnostic Characteristics: This macrogroup is dominated by halophytic, succulent dwarf evergreen shrubs *Batis maritima, Cryptocarpus pyriformis, Rachicallis americana*, annual or perennial succulents, and by graminoids *Cyperus laevigatus, Distichlis spicata, Paspalum vaginatum, Sporobolus virginicus*, and *Spartina alterniflora*. Further review is needed to determine whether distinctive tropical species can be listed that separate this type from the temperate salt marshes.

\*Classification Comments: It is unclear if tropical salt marshes occur in south Florida, but if they are associated with mangrove habitats, they would be included here.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M079 | North American Atlantic & Gulf Coastal Salt Marsh | ranges along the Atlantic coast and Gulf of Mexico south to northern Mexico. |
| M085 | West Pacific Salt Marsh | covers the west coast salt marshes of tropical South and Central America. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is characterized by halophytic succulent dwarf-shrubs and herbs, and graminoids, with a notably simple structure, often forming large, even-height monotypic patches, especially where tidal flooding is regular. Marshes of mixed height, comprising graminoids and forbs, are often more characteristic in brackish settings. Shrubs may be interspersed, especially near the transition to upland or non-tidal vegetation, with graminoid cover remaining extensive below. Where present, shrub cover can range widely. Vegetation may also be very sparse on immediate shorelines and tidal flats.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The vegetation is dominated or characterized by an abundance of halophytic species, including grasses, sedges, low shrubs or succulents. Dominant graminoids include *Cyperus laevigatus, Distichlis spicata, Paspalum vaginatum, Sporobolus virginicus*, and *Spartina alterniflora (= Spartina brasiliensis)*. Succulent herbs include *Alternanthera maritima, Blutaparon vermiculare (= Philoxerus vermicularis), Philoxerus portulacoides*, and *Sesuvium portulacastrum*. Halophytic shrubs include *Atriplex cristata, Batis maritima, Cryptocarpus pyriformis*, and *Salicornia "virginica"* s.l. (*Salicornia "fruticosa"* s.l.). Salt marsh shrub thickets are dominated by *Hibiscus tiliaceus*, forming an often dense belt of thickets immediately inland from mangrove formations of the Brazilian and Guianan coasts (Institute of Terrestrial Ecology 1996).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The main natural factors that are responsible for the vegetation composition and processes in the estuarine and coastal wetland habitats where these marshes develop are freshwater flow, seasonal freshwater pulsing, estuarine salinity, tidal flushing, coastal geomorphology, and depositional area for sediment and nutrient input. Adams (1990) states that there may be a dynamic relationship between mangroves and salt marsh; as the salt marsh advances seaward, so the upper part of the marsh is invaded and replaced by mangrove.

ENVIRONMENT

Environmental Description: Where hypersaline conditions develop in the upper intertidal zone, extensive salt flats may occur above the level of mangrove (Adams 1990). West (1977) states that extensive salt marshes can occur as (1) a pioneer community on the ocean side of mangroves, (2) as a zone on the inner edge or within a mangrove stand, or (3) as a secondary or disturbance type on disturbed or degraded mangrove stands. These disturbed types may be dominated by *Spartina alterniflora* or the fern *Acrostichum aureum*. Salt marshes and salt flats are regularly to irregularly flooded by shallow polyhaline waters as a result of lunar, wind and storm tides. Brackish tidal marshes develop along estuaries where freshwater mixes with ocean saltwater moving up the estuary from the tidal force. They also occur near uplands where freshwater inputs reduce the salinity of the salt marsh. Waters in brackish marshes are generally in the salinity range of 0.5-18 ppt, and the vegetation is subject to flooding from the twice-daily tides. Salt marsh soils range from deep mucks with high clay and organic content in the deeper portions to silts and fine sands in higher areas. The organic soils have a high salinity, neutral reaction, and high sulfur content (FNAI 2010a).

DISTRIBUTION

\*Geographic Range: This macrogroup is found in the Antilles and the Caribbean and Atlantic coasts of South America south to southern Brazil.

Nations: BR, BS, CO, CU, DO, GY, JM, KY, MQ, PR, SR, US, VE, XC

States/Provinces: FL

USFS Ecoregions (2007) [optional]: 411A:??

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G486 | Caribbean Salt Flat & Pond |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-03-26 | M084 Caribbean & Central American Salt Marsh Macrogroup | M084 replaced by M735 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | *Batidi-Salicornietea* | Borhidi 1991 |  |
| > | Tropical coastal salt marshes | Institute of Terrestrial Ecology 1996 | The authors include in this type all Caribbean and South American salt marshes. We include only the Atlantic and Caribbean salt marsh. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Institute of Terrestrial Ecology (1996)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Faber-Langendoen and C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

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Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Institute of Terrestrial Ecology. 1996. Habitats of South America. Report May 1996. Institute of Terrestrial Ecology and Institut Royal des Sciences Naturelles de Belgique. 417 pp.

West, R. C. 1977. Tidal salt-marsh and mangal formations of Middle and South America. Pages 193-213 in: V. J. Chapmann, editor. Ecosystems of the world. 1. Wet coastal ecosystems. Elsevier, Amsterdam.

3. Desert & Semi-Desert

Cool and warm semi-deserts dominated by xeromorphic growth forms, including *succulent* (e.g., cacti, euphorbias) and *small-leaved shrubs* and *trees*, desert grasses and other xeromorphic growth forms, with an irregular horizontal canopy spacing that is often open to very sparse (1%) cover.

3.A. Warm Desert & Semi-Desert Woodland, Scrub & Grassland

Warm Desert & Semi-Desert Woodland, Scrub & Grassland occurs in dry warm-temperate, subtropical and tropical climates, uncommon near the equator to increasingly common between 15° and 35°N and S latitude.

3.A.1. Tropical Thorn Woodland

Tropical Thorn Woodland includes warm semi-arid or arid deciduous woodlands and low forests with xeromorphic adaptations found in Tropical, Mediterranean and Temperate xeric and desertic bioclimates around the globe, uncommon near the equator to increasingly common between 15° and 35°N and S latitude.

3. Desert & Semi-Desert

3.A.1.Ea. Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland

D287. Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.A.1.Ea. Tropical Thorn Woodland (F039)

Elcode: D287

\*Scientific Name: Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland Division

\*Common (Translated Scientific) Name: Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland Division

\*Colloquial Name: Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: GT, MX

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M765 | Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Ea. Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland

M765. Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland

Type Concept Sentence: Subtropical semi-desert thorn scrub of central Mexico and adjacent northern Central America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.1.Ea. Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland (D287)

Elcode: M765

\*Scientific Name: Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland Macrogroup

\*Common (Translated Scientific) Name: Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland Macrogroup

\*Colloquial Name: Caribbean-Northern Mesoamerican Xeromorphic Scrub & Woodland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: GT, MX

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Eb. Colombian-Venezuelan Xeromorphic Scrub & Woodland

D288. Colombian-Venezuelan Xeromorphic Scrub & Woodland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.A.1.Eb. Tropical Thorn Woodland (F039)

Elcode: D288

\*Scientific Name: Colombian-Venezuelan Xeromorphic Scrub & Woodland Division

\*Common (Translated Scientific) Name: Colombian-Venezuelan Xeromorphic Scrub & Woodland Division

\*Colloquial Name: Colombian-Venezuelan Xeromorphic Scrub & Woodland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M766 | Guajiran Xeromorphic Scrub & Woodland |
| M767 | Tumbesian Xeromorphic Scrub & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Eb. Colombian-Venezuelan Xeromorphic Scrub & Woodland

M766. Guajiran Xeromorphic Scrub & Woodland

Type Concept Sentence: Tall scrub or woodland that occurs on dry, sandy, clayish soils along the Caribbean coast of Colombia and Venezuela. The vegetation has three layers, with the highest reaching 5-8 m. Where the drought stress is more pronounced, columnar cacti dominate the upper layer.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.1.Eb. Colombian-Venezuelan Xeromorphic Scrub & Woodland (D288)

Elcode: M766

\*Scientific Name: Guajiran Xeromorphic Scrub & Woodland Macrogroup

\*Common (Translated Scientific) Name: Guajiran Xeromorphic Scrub & Woodland Macrogroup

\*Colloquial Name: Guajiran Xeromorphic Scrub & Woodland

\*Type Concept: This macrogroup represents the vegetation that occurs on dry sandy-clayish soils on the northwestern shore of Lake Maracaibo, the Guajira Peninsula and xeric lowlands of the Caribbean coast of Colombia. In Venezuela it extends to the east along the littoral. This type of tall scrub or woodland has three layers, the highest reaches 5-8 m. Where the drought stress is more pronounced, columnar cacti dominate the upper layer. Diagnostic species include *Acacia tortuosa, Vachellia farnesiana (= Acacia farnesiana), Prosopis juliflora, Pilosocereus moritzianus, Caesalpinia coriaria, Calliandra obtusifolia, Pereskia guamacho, Pereskia colombiana, Opuntia caribaea, Aspidosperma cuspa, Melochia tomentosa, Haematoxylon basiletto, Jatropha gossypiifolia, Jacquinia* spp., *Stenocereus griseus (= Ritterocereus griseus), Parkinsonia aculeata, Amaranthus dubius, Croton ovalifolius, Agave cocui, Erythrina velutina, Clerodendrum ternifolium, Gyrocarpus americanus, Cereus margaritensis, Caesalpinia coriaria (= Libidibia coriaria), Cordia curassavica, Bursera graveolens, Tabebuia billbergii, Astronium graveolens, Bulnesia arborea, Phyllostylon rhamnoides, Bumelia obtusifolia, Piptadenia flava, Acacia glomerosa, Copaifera venezuelana, Gyrocarpus americanus, Talisia olivaeformis, Platymiscium pinnatum, Lonchocarpus atropurpureus, Lonchocarpus punctatus, Lonchocarpus sanctae-marthae, Platymiscium polystachium, Capparis odoratissima*, and *Vitex cymosa*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Eb. Colombian-Venezuelan Xeromorphic Scrub & Woodland

M767. Tumbesian Xeromorphic Scrub & Woodland

Type Concept Sentence: Xeromorphic woodland and dense, shorter scrub distributed along the Pacific coast and a few kilometers inland from central Ecuador to northern Peru. Found on sandy clayish soils where there is a pronounced dry season. Woodlands are 5-6 m high, and component tree species have small and sclerophyllous leaves. Columnar cacti are abundant whereas grasses are uncommon. Broad-leaved herbs are present in the lower stratum. Communities are typically formed by *Bursera graveolens, Caesalpinia paipay, Capparis* spp., *Cordia lutea, Croton rivinifolius, Erythrina smithiana, Hippomane mancinella, Jatropha curcas, Loxopterygium huasango, Maytenus octagona, Pithecellobium excelsum, Prosopis pallida*, and several cactus species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.1.Eb. Colombian-Venezuelan Xeromorphic Scrub & Woodland (D288)

Elcode: M767

\*Scientific Name: Tumbesian Xeromorphic Scrub & Woodland Macrogroup

\*Common (Translated Scientific) Name: Tumbesian Xeromorphic Scrub & Woodland Macrogroup

\*Colloquial Name: Tumbesian Xeromorphic Scrub & Woodland

\*Type Concept: The macrogroup includes xeromorphic woodland and also more dense, shorter scrub distributed along the Pacific littoral and a few kilometers inland, from central Ecuador to northern Peru where its limit is the Sechura Desert to the south. It occurs on sandy-clayish soils and with a pronounced dry season. Woodlands are 5-6 m high on average and may contain a few emergents of up to 8-10 m. Component tree species have small and sclerophyllous leaves. Columnar cacti are abundant and become part of the shrub stratum. Grasses are uncommon but broad-leaved herbs are present in the lower stratum together with short cacti. In the southernmost portion of its distribution it becomes less species-rich and mostly dominated by *Prosopis pallida* in association with *Acacia macracantha* and several species of *Capparis*. More characteristic and diverse communities are typically formed by *Bursera graveolens, Eriotheca ruizii, Erythrina smithiana, Prosopis pallida, Pithecellobium excelsum, Caesalpinia paipay, Loxopterygium huasango, Bougainvillea peruviana, Cordia lutea, Maytenus octagona, Croton rivinifolius, Croton glabellus, Hippomane mancinella, Jatropha curcas, Capparis* spp., *Armatocereus cartwrightianus, Monvillea diffusa, Abutilon pubistamineum, Ipomoea pes-caprae, Ipomoea carnea, Pisonia* sp., *Jacquinia sprucei, Celtis iguanaea, Trema micrantha, Urera caracasana, Sideroxylon obtusifolium, Cryptocarpus pyriformis, Luffa operculata, Heliotropium angiospermum, Neoraimondia gigantea, Cercidium praecox, Pilosocereus tweedianus, Monvillea maritima, Taarbranthocereus* sp., *Opuntia macbridae*, and *Malocactus bellavistensis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M677 Tumbes Guayaquil Deciduous Shrubland Macrogroup | M677 concept covered by M767 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Ec. Interandean Valley Xeromorphic Scrub & Woodland

D289. Interandean Valley Xeromorphic Scrub & Woodland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.A.1.Ec. Tropical Thorn Woodland (F039)

Elcode: D289

\*Scientific Name: Interandean Valley Xeromorphic Scrub & Woodland Division

\*Common (Translated Scientific) Name: Interandean Valley Xeromorphic Scrub & Woodland Division

\*Colloquial Name: Interandean Valley Xeromorphic Scrub & Woodland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M770 | Bolivian-Tucuman Xeromorphic Scrub & Woodland |
| M769 | Central Andean Xeromorphic Scrub & Woodland |
| M768 | Northern Andean Xeromorphic Scrub & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Ec. Interandean Valley Xeromorphic Scrub & Woodland

M770. Bolivian-Tucuman Xeromorphic Scrub & Woodland

Type Concept Sentence: Xeromorphic vegetation of the intermontane valleys of the eastern slopes of the Andes from Cochabamba in central Bolivia to central northwestern Argentina. In addition to the orographic rainshadow effect, at these latitudes the climate is strongly seasonal, creating xeric to semi-arid conditions in these valleys. Plant communities include deciduous woodlands and thorn scrub characterized by *Bougainvillea berberidifolia, Cardenasiodendron brachypterum, Escallonia millegrana, Espostoa guentherii, Gochnatia palosanto, Kageneckia lanceolata, Loxopterygium grisebachii, Neocardenasia herzogiana, Prosopis kuntzei, Ruprechtia apetala, Schinopsis haenkeana*, and *Tecoma tenuifolia*. Also includes communities growing between 2000-2900 m elevation and restricted to the Tarija and Jujuy valleys in Bolivia and Argentina, respectively, formed by low, open woodlands and dominated by microphyllous species with abundant columnar and globular cacti.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.1.Ec. Interandean Valley Xeromorphic Scrub & Woodland (D289)

Elcode: M770

\*Scientific Name: Bolivian-Tucuman Xeromorphic Scrub & Woodland Macrogroup

\*Common (Translated Scientific) Name: Bolivian-Tucuman Xeromorphic Scrub & Woodland Macrogroup

\*Colloquial Name: Bolivian-Tucuman Xeromorphic Scrub & Woodland

\*Type Concept: This macrogroup represents the xeromorphic vegetation of the intermontane valleys of the eastern slopes of the Andes in the biogeographic region known as Boliviano-Tucumano, from Cochabamba in central Bolivia to central northwestern Argentina. Besides the orographic rainshadow effect, at these latitudes the climate is strongly seasonal, creating xeric to semi-arid conditions in the inter-Andean valleys. Elevations vary between 800-900 to 2800 m. Communities include partially open deciduous forests to open woodlands and thorn scrub. Characteristic species in the upper belt of this type are *Kageneckia lanceolata, Escallonia millegrana*, and *Carica quercifolia*, and in the lower elevation, *Schinopsis haenkeana, Cardenasiodendron brachypterum, Loxopterygium grisebachii, Espostoa guentherii, Neocardenasia herzogiana, Ruprechtia apetala, Bougainvillea berberidifolia, Prosopis kuntzei, Gochnatia palosanto*, and *Tecoma tenuifolia*. Herbs and shrubs that thrive in seral stages of these types are *Gochnatia glutinosa, Flourensia fiebrigii, Aphyllocladus spartioides, Nardophyllum armatum, Senna hookeriana, Pappophorum philippianum, Eragrostis nigricans, Aristida friesii, Stipa leptostachya, Pennisetum chilense*, and *Erioneuron avenaceum*. The macrogroup also includes communities growing between 2000-2900 m altitude, restricted to Tarija and Jujuy valleys in Bolivia and Argentina, respectively, formed by shrublands or low woodlands, with semi open canopy dominated by very xeromorphic microphyllous species with abundant columnar and globular cacti. Diagnostic species of this group are *Acacia feddeana, Cercidium andicola, Hyaloseris camataquiensis, Gochnatia cardenasii, Gochnatia glutinosa, Bulnesia rivas-martinezii, Weingartia cintiensis, Senecio quinquelepis*, and *Senna crassirramea*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Ec. Interandean Valley Xeromorphic Scrub & Woodland

M769. Central Andean Xeromorphic Scrub & Woodland

Type Concept Sentence: Vegetation of the intermontane valleys of the eastern slopes of the Andes from north-central Peru to Bolivia where orographic rainshadows create xeric to semi-arid conditions. For communities distributed from 2100-3200 m elevation, diagnostic species are *Cantua pyrifolia, Carica quercifolia, Colletia spinosissima, Delostoma integrifolium, Haplorhus peruviana, Jacaranda mimosifolia, Kageneckia lanceolata, Mutisia acuminata, Schinus dependens, Schinus molle, Schinus pearcei, Tecoma arequipensis, Tecoma sambucifolia*, and *Zanthoxylum mantaro*. In valley bottoms, dense woodlands form a deciduous, semi-closed canopy 8-15 m tall, dominated by Anacardiaceae and Legume species accompanied by numerous shrubs and cacti. Also includes the sclerophyllous, open woodlands of the xerophytic Puna in southern Bolivia, northern Argentina and Chile, between 2000-3900 m elevation.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.1.Ec. Interandean Valley Xeromorphic Scrub & Woodland (D289)

Elcode: M769

\*Scientific Name: Central Andean Xeromorphic Scrub & Woodland Macrogroup

\*Common (Translated Scientific) Name: Central Andean Xeromorphic Scrub & Woodland Macrogroup

\*Colloquial Name: Central Andean Xeromorphic Scrub & Woodland

\*Type Concept: This macrogroup represents the vegetation of the intermontane valleys of the eastern slopes of the Andes from central-northern Peru to Bolivia. In this case too, the strong climatic effect of the orographic rainshadow, creates xeric to semi-arid conditions. For communities distributed from 2100-3200 m elevation, diagnostic species are *Caesalpinia spinosa, Acacia macracantha, Kageneckia lanceolata, Tecoma sambucifolia, Tecoma arequipensis, Schinus molle, Schinus pearcei, Schinus dependens, Cantua pyrifolia, Mutisia acuminata, Colletia spinosissima, Carica quercifolia, Delostoma integrifolium, Zanthoxylum mantaro, Jacaranda mimosifolia (= Jacaranda acutifolia), Haplorhus peruviana, Apurimacia boliviana, Fourcraea andina, Cereus vargasianus, Chuquiraga ferox*, and *Puya* spp. The macrogroup also includes more dense woodlands in the lower portions of some of these valleys, between 900-2000 m elevation. Here they form a deciduous, semi-closed canopy 8-15 m tall, dominated by Anacardiaceae and Fabaceae species, accompanied by numerous shrubs and bushes, with many Cactaceae species. Lastly, the macrogroup includes scrub or very open sclerophyllous, evergreen woodlands of the Xerophytic Puna in southern Bolivia, northern Argentina and Chile, between 2000-3900 m elevation. The main tree component of these communities is *Polylepis tomentella ssp. tomentella*, accompanied by *Dasyphyllum hystrix, Berberis chrysacantha, Trichocereus tarijensis, Lophopappus cuneatus, Oreocereus celsianus*, and *Prosopis ferox*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Ec. Interandean Valley Xeromorphic Scrub & Woodland

M768. Northern Andean Xeromorphic Scrub & Woodland

Type Concept Sentence: Open woodlands and scrub of dry intermontane valleys of the Andes in Venezuela, Colombia, Ecuador and northwestern Peru. These valleys are located between 1500 and 2600 m elevation where rainshadows and high insolation create xeric conditions. Members of the Cactaceae are dominant in the understory. Trees are 6-8 m high and typically have bromeliad epiphytes. Important species are *Acacia macracantha, Cercidium praecox, Condalia* sp., *Coursetia caribaea, Croton wagneri, Dodonaea viscosa, Fourcraea* sp., *Prosopis juliflora, Schinus molle, Xylosma velutinum*, and several cacti.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.1.Ec. Interandean Valley Xeromorphic Scrub & Woodland (D289)

Elcode: M768

\*Scientific Name: Northern Andean Xeromorphic Scrub & Woodland Macrogroup

\*Common (Translated Scientific) Name: Northern Andean Xeromorphic Scrub & Woodland Macrogroup

\*Colloquial Name: Northern Andean Xeromorphic Scrub & Woodland

\*Type Concept: This macrogroup includes the open woodlands and scrub of the dry to xeric intermontane valleys of the Andes in Venezuela, Colombia, Ecuador and northwestern portions of Peru. These valleys, located between approximately 1500 and 2600 m, experience the rainshadow effect and get low amounts of rain during the year which, combined with high insolation, creates a xeric environment for the plant communities. The forest cover is open and the density of the shrub and herb layer cover depends on the moisture availability. Members of the Cactaceae are dominant in the understory. Trees are 6-8 m high and usually are covered with epiphytes of the Bromeliaceae. *Acacia macracantha* is the dominant tree accompanied by *Prosopis juliflora, Schinus molle, Xylosma velutinum, Cercidium praecox, Coursetia caribaea, Croton wagneri, Dodonaea viscosa, Condalia* sp., *Fourcraea* sp., and several cacti species, including *Mammillaria colombiana, Pilosocereus* spp., *Cleistocactus* spp., *Stenocereus griseus, Cereus hexagonus, Armatocereus griseus, Armatocereus humilis, Opuntia wentiana, Opuntia pittieri, Opuntia dillenii, Opuntia elatior, Opuntia pubescens, Cylindropuntia tunicata (= Opuntia tunicata)*, among many other. Also included in the macrogroup are the xeromorphic woodland and scrub of the lower reaches of the Andean valleys, between 800-1500 m elevation, where depending on the location they transition into lowland floras of different floristic affinities; therefore, the composition varies significantly.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Ed. Chaco Xeromorphic Scrub & Woodland

D290. Chaco Xeromorphic Scrub & Woodland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.A.1.Ed. Tropical Thorn Woodland (F039)

Elcode: D290

\*Scientific Name: Chaco Xeromorphic Scrub & Woodland Division

\*Common (Translated Scientific) Name: Chaco Xeromorphic Scrub & Woodland Division

\*Colloquial Name: Chaco Xeromorphic Scrub & Woodland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M773 | Southern Chaco Xeromorphic Scrub & Woodland |
| M772 | Northeastern Chaco Xeromorphic Scrub & Woodland |
| M771 | Northwestern Chaco Xeromorphic Scrub & Woodland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Ed. Chaco Xeromorphic Scrub & Woodland

M773. Southern Chaco Xeromorphic Scrub & Woodland

Type Concept Sentence: Open xeromorphic woodlands of the alluvial plains of the Argentinian Mesopotamia, in an area wedged between the Uruguayan pampas and the Espinal and humid Chaco of Argentina. Two types of communities can be found: one on very flat, moderately drained and poor soils and dominated by *Acacia caven, Aspidosperma quebracho-blanco, Celtis tala*, and/or *Geoffroea decorticans*. The other type is found on well-drained topographic uplands, and is dominated by *Prosopis affinis* or *Prosopis nigra*. A well-developed grassland occurs below the open tree layer. Also includes the southern variant of the Chaco forests, dominated by *Prosopis* spp. and *Larrea tridentata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.1.Ed. Chaco Xeromorphic Scrub & Woodland (D290)

Elcode: M773

\*Scientific Name: Southern Chaco Xeromorphic Scrub & Woodland Macrogroup

\*Common (Translated Scientific) Name: Southern Chaco Xeromorphic Scrub & Woodland Macrogroup

\*Colloquial Name: Southern Chaco Xeromorphic Scrub & Woodland

\*Type Concept: The macrogroup includes open xeromorphic woodlands of the alluvial plains of the Argentinian Mesopotamia, an area wedged between the Uruguayan Pampas, and the Espinal and humid Chaco of Argentina. In this area two types of communities can be found. The first occurs on very flat, moderately drained and poor soils, and is dominated by *Acacia caven, Aspidosperma quebracho-blanco, Celtis tala*, and/or *Geoffroea decorticans*. The other type occurs on well-drained topographic uplands, and is dominated by *Prosopis affinis* or *Prosopis nigra*; a well-developed grassland occurs below the open tree layer. The macrogroup also includes the southern variant of the Chaco forests in central western Argentina. This forest is 5-10 m tall with scattered emergents, deciduous and with a semi-open canopy, growing on moderately drained soils. It shows an impoverished floristic composition, but at the same time it incorporates a few new elements from the adjacent Monte biogeographic region. Diagnostic species are *Aspidosperma quebracho-blanco, Prosopis flexuosa, Prosopis pugionata, Prosopis torquata, Cercidium australe, Larrea tridentata (= Larrea divaricata), Larrea cuneifolia, Mimozyganthus carinatus, Celtis ehrenbergiana (= Celtis pallida), Bulnesia foliosa, Bulnesia retama, Cassia aphylla, Condalia microphylla, Atamisquea emarginata (= Capparis atamisquea)*, and *Deinacanthion urbanianum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Ed. Chaco Xeromorphic Scrub & Woodland

M772. Northeastern Chaco Xeromorphic Scrub & Woodland

Type Concept Sentence: Includes two types of upland forest of the northeastern Chaco. One is the subhumid deciduous forest, 18-22 m tall and distributed in Paraguay and Argentina where it is transitional to the Parana floristic region. Diagnostic species are *Arecastrum romanzoffianum, Astronium balansae, Diatenopteryx sorbifolia, Helietta apiculata, Holocalyx balansae, Myrocarpus frondosus, Nectandra saligna, Parapiptadenia rigida*, and *Schinopsis balansae*. The second type, locally called "dorso," is a lower, open forest, 12-18 m high, on sandy loam soils, which form small elevations relative to the otherwise flat terrain. Diagnostic species are *Aspidosperma quebracho-blanco, Caesalpinia paraguariensis, Atamisquea emarginata, Geoffroea decorticans, Maytenus vitis-idaea, Prosopis kuntzei, Schinopsis balansae, Schinopsis heterophylla, Schinopsis quebracho-colorado*, and *Ziziphus mistol*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.1.Ed. Chaco Xeromorphic Scrub & Woodland (D290)

Elcode: M772

\*Scientific Name: Northeastern Chaco Xeromorphic Scrub & Woodland Macrogroup

\*Common (Translated Scientific) Name: Northeastern Chaco Xeromorphic Scrub & Woodland Macrogroup

\*Colloquial Name: Northeastern Chaco Xeromorphic Scrub & Woodland

\*Type Concept: The macrogroup includes two types of upland forest of the northeastern Chaco. One is the sub-humid deciduous forest of semi-closed canopy, 18-22 m tall, distributed in the eastern margin of the northern Chaco in Paraguay and Argentina, transitional to the Parana floristic region. Its diagnostic species are *Astronium balansae, Schinopsis balansae, Helietta apiculata, Myrocarpus frondosus, Diatenopteryx sorbifolia, Holocalyx balansae, Parapiptadenia rigida, Gleditsia amorphoides, Arecastrum romanzoffianum, Chusquea ramosissima, Nectandra saligna, Ruprechtia laxiflora*. The second type is a xeric, semi-open forest, 12-18 m high, occurring on sandy loam soils originated in deposits of the loessic soils of Argentinian Pampas, which form small elevations relative to the otherwise flat terrain, which are locally called "dorso." Diagnostic species for this type are *Schinopsis balansae, Schinopsis quebracho-colorado (= Schinopsis lorentzii), Schinopsis heterophylla, Aspidosperma quebracho-blanco, Ziziphus mistol, Caesalpinia paraguariensis, Prosopis kuntzei, Prosopis alba, Cercidium praecox, Geoffroea decorticans, Ruprechtia laxiflora, Maytenus vitis-idaea, Atamisquea emarginata (= Capparis atamisquea)*, among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | M353 Eastern Chaco Shrubland & Savanna Macrogroup | M353 replaced by M772 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.1.Ed. Chaco Xeromorphic Scrub & Woodland

M771. Northwestern Chaco Xeromorphic Scrub & Woodland

Type Concept Sentence: Xeromorphic woodlands of the northwestern Chaco region in southeastern Bolivia, western Paraguay and northern Argentina. These are 5-7 m high, semi-closed, deciduous thorn scrubs, with scattered emergents. They grow on sandy loam or clay loam soils that are moderately well-drained, located on the paleo alluvial plains formed by the large rivers in the region. Characteristic species are *Aspidosperma quebracho-blanco, Chorisia insignis, Ruprechtia triflora, Schinopsis quebracho-colorado, Stetsonia coryne*, and *Ziziphus mistol*. The woodlands distributed in the northwestern edge of the Chaco region along the foothills of the Andes are characterized by *Acacia etilis, Astronium urundeuva, Calycophyllum multiflorum, Loxopterygium grisebachii, Phyllostylon rhamnoides*, among other species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.1.Ed. Chaco Xeromorphic Scrub & Woodland (D290)

Elcode: M771

\*Scientific Name: Northwestern Chaco Xeromorphic Scrub & Woodland Macrogroup

\*Common (Translated Scientific) Name: Northwestern Chaco Xeromorphic Scrub & Woodland Macrogroup

\*Colloquial Name: Northwestern Chaco Xeromorphic Scrub & Woodland

\*Type Concept: This macrogroup represents the xeromorphic forests or woodlands of the northwestern Chaco region in southeastern Bolivia, western Paraguay and northern Argentina. These are 5- to 7-m high, semi-closed forests or thorn scrubs, deciduous, with scattered emergents 15-20 m tall. They grow on sandy loam or clay loam soils, moderately well-drained of the paleo-alluvial plains of large rivers existing in the region. Characteristic species are *Aspidosperma quebracho-blanco, Ruprechtia triflora, Schinopsis quebracho-colorado (= Schinopsis lorentzii), Chorisia insignis, Capparis speciosa, Capparis retusa, Capparis salicifolia, Ziziphus mistol, Stetsonia coryne, Cereus validus, Quiabentia pflanzii, Celtis chichape, Celtis ehrenbergiana (= Celtis pallida), Ximenia argentinensis, Castela coccinea, Browningia caineana, Acacia praecox, Cleistocactus baumannii, Arrabidaea truncata, Maytenus spinosus, Bougainvillea* spp., *Bromelia* spp., *Dyckia ferox, Caesalpinia paraguariensis*, and *Harrisia pomanensis*. Other types included in this macrogroup are the woodlands distributed in the northwestern edge of the Chaco region, along the foothills of the Andes. Diagnostic species of this type are *Loxopterygium grisebachii, Astronium urundeuva, Calycophyllum multiflorum, Phyllostylon rhamnoides, Acacia etilis, Schaefferia argentinensis, Saccellium lanceolatum, Tabebuia impetiginosa*, and *Caesalpinia floribunda*. A final xeromorphic woodland type included is a community type that grows on sandy soils (dune fields) from eolian sand deposits and on the sandstone hills of the northwestern Chaco in Bolivia and Paraguay. *Schinopsis cornuta* is the diagnostic species of this type.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3.A.2. Warm Desert & Semi-Desert Scrub & Grassland

Warm Desert & Semi-Desert Scrub & Grassland occurs in dry warm-temperate, subtropical and tropical climates, is uncommon near the equator to increasingly common between 15° and 35°N and S latitude.

3. Desert & Semi-Desert

3.A.2.Ek. Tropical Andean Xeromorphic Scrub & Grassland

D291. Tropical Andean Xeromorphic Scrub & Grassland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.A.2.Ek. Warm Desert & Semi-Desert Scrub & Grassland (F015)

Elcode: D291

\*Scientific Name: Tropical Andean Xeromorphic Scrub & Grassland Division

\*Common (Translated Scientific) Name: Tropical Andean Xeromorphic Scrub & Grassland Division

\*Colloquial Name: Tropical Andean Xeromorphic Scrub & Grassland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M777 | Bolivian-Tucuman Interandean Xeromorphic Scrub & Grassland |
| M776 | Central Interandean Xeromorphic Scrub & Grassland |
| M775 | Northern Interandean Xeromorphic Scrub & Grassland |
| M140 | Tropical Andean Xeromorphic Cliff, Scree & Other Rock Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.Ek. Tropical Andean Xeromorphic Scrub & Grassland

M777. Bolivian-Tucuman Interandean Xeromorphic Scrub & Grassland

Type Concept Sentence: Plant communities that develop in xeric to semi-arid conditions between 900 and 3000 m elevation on the steep slopes of intermontane valleys of Bolivia and Argentina. Characterized by microphyllous and thorny, resinous sparse scrubs up to 1-2 m high, bunchgrasses, and forbs growing on poor soils. Diagnostic species are *Croton baillonianus, Dodonaea viscosa, Kentrothamnus weddellianus, Lantana canescens, Lycianthes lycioides, Proustia pungens, Salvia haenkei*, with *Acalypha lycioides, Aloysia gratissima, Baccharis ulicina, Cardiospermum halicacabum*, and *Lippia boliviana* at lower elevations. These communities sometimes form after anthropogenic disturbance of more complex xeromorphic woodlands.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Ek. Tropical Andean Xeromorphic Scrub & Grassland (D291)

Elcode: M777

\*Scientific Name: Bolivian-Tucuman Interandean Xeromorphic Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Bolivian-Tucuman Interandean Xeromorphic Scrub & Grassland Macrogroup

\*Colloquial Name: Bolivian-Tucuman Interandean Xeromorphic Scrub & Grassland

\*Type Concept: This macrogroup represents the plant communities that develop in xeric to semi-arid conditions between 900 and 3000 m elevation in the steep slopes of intermontane valleys of Bolivia and Argentina. These are formed by microphyllous and thorny, resinous sparse scrubs up to 1-2 m high, bunchgrasses, and forbs growing in a harsh environment and poor soils. Diagnostic species are *Kentrothamnus weddellianus, Proustia pungens, Dodonaea viscosa, Lycianthes lycioides, Croton baillonianus, Lantana canescens, Salvia haenkei, Verbesina cinerea*, with *Aloysia gratissima, Lippia boliviana, Lantana* spp., *Acalypha lycioides, Baccharis ulicina, Croton baillonianus, Cardiospermum halicacabum, Vernonia saltensis*, and *Zexmenia brachylepis* in the lower elevations. Communities of this type are in some cases the result of permanent alteration of previously more complex xeromorphic shrublands and woodlands, due to anthropogenic disturbance.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.Ek. Tropical Andean Xeromorphic Scrub & Grassland

M776. Central Interandean Xeromorphic Scrub & Grassland

Type Concept Sentence: Plant communities that develop on eroded, mineral soils in xeric to semi-arid conditions between 900 and 2900 m elevation on the steep slopes of the intermontane valleys of Peru and Bolivia. Characterized by microphyllous, sparse scrubs, bunchgrasses, and forbs. Diagnostic species are *Acalypha lycioides, Adesmia miraflorensis, Aloysia scorodonioides, Atriplex semibaccata, Cnidoscolus* spp., *Condalia weberbaueri, Coreopsis fasciculata, Croton apurimacensis, Cylindropuntia subulata, Dunalia mandonii, Krameria lappacea, Lantana balansae, Lippia boliviana, Lippia weberbauerii, Opuntia pubescens, Opuntia sulphurea, Pappophorum* spp., *Porlieria microphylla, Tribulus* sp., *Trichocereus tarmensis*, and *Viguiera pazensis*. Among the grasses are *Stipa ichu, Chloris, Leptochloa*, and *Cenchrus* spp.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Ek. Tropical Andean Xeromorphic Scrub & Grassland (D291)

Elcode: M776

\*Scientific Name: Central Interandean Xeromorphic Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Central Interandean Xeromorphic Scrub & Grassland Macrogroup

\*Colloquial Name: Central Interandean Xeromorphic Scrub & Grassland

\*Type Concept: This macrogroup represents the plant communities that develop in xeric to semi-arid conditions between 900 and 2900 m elevation in the steep slopes of intermontane valleys of Peru and Bolivia, on eroded, mineral soils. These are formed by microphyllous, resinous sparse scrubs, bunchgrasses, and forbs growing in a harsh environment. Diagnostic species are *Croton apurimacensis, Lantana balansae, Lippia boliviana, Lippia weberbauerii, Opuntia sulphurea, Opuntia pubescens, Aloysia scorodonioides, Acalypha lycioides, Coreopsis fasciculata, Trichocereus tarmensis, Cylindropuntia subulata, Dunalia mandonii, Flourensia* spp., *Wissadula andina, Adesmia miraflorensis, Condalia weberbaueri, Krameria lappacea, Atriplex semibaccata, Viguiera pazensis, Heliotropium incanum, Rhynchelitrum repens, Porlieria microphylla, Pappophorum* spp., *Cnidoscolus* spp., and *Tribulus* sp., and among the grasses are *Stipa ichu, Chloris, Leptochloa*, and *Cenchrus* spp. Communities of this type are in some cases the result of permanent alteration of previously more complex xeromorphic shrublands and woodlands, due to anthropogenic disturbance.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.Ek. Tropical Andean Xeromorphic Scrub & Grassland

M775. Northern Interandean Xeromorphic Scrub & Grassland

Type Concept Sentence: Xerophytic shrublands of arid intermontane valleys in the Andes of southern Ecuador and northern Peru, growing between 800 and 1500 m elevation in areas with a pronounced dry season. Characteristic species are *Acacia macracantha, Cercidium praecox, Colicodendron scabridum, Croton wagneri, Duranta dombeyana, Jatropha curcas, Lantana rugulosa, Lantana trifolia, Opuntia quitensis, Parkinsonia aculeata, Pisonia aculeata, Sapindus saponaria*, and *Senna mollissima*. The communities occurring in the lower reaches of the Marañon valley in northern Peru have greater plant diversity, including many members of the Cactaceae family.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Ek. Tropical Andean Xeromorphic Scrub & Grassland (D291)

Elcode: M775

\*Scientific Name: Northern Interandean Xeromorphic Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Northern Interandean Xeromorphic Scrub & Grassland Macrogroup

\*Colloquial Name: Northern Interandean Xeromorphic Scrub & Grassland

\*Type Concept: The macrogroup represents the xerophytic shrublands of arid intermontane valleys in the Andes of southern Ecuador and northern Peru, growing between 800-1500 m elevation, with a pronounced dry season. Characteristic species are *Acacia macracantha, Cercidium praecox, Colicodendron scabridum, Croton wagneri, Duranta dombeyana, Jatropha curcas, Lantana rugulosa, Lantana trifolia, Opuntia quitensis, Parkinsonia aculeata, Pisonia aculeata, Sapindus saponaria*, and *Senna mollissima*, which most likely represent impoverished stages of the original vegetation. The communities occurring in the lower reaches of the Maranon valley in northern Peru have a richer set of species representing this type, especially of the Cactaceae family.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.El. Brazilian-Parana Xeromorphic Scrub & Grassland

D292. Brazilian-Parana Xeromorphic Scrub & Grassland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.A.2.El. Warm Desert & Semi-Desert Scrub & Grassland (F015)

Elcode: D292

\*Scientific Name: Brazilian-Parana Xeromorphic Scrub & Grassland Division

\*Common (Translated Scientific) Name: Brazilian-Parana Xeromorphic Scrub & Grassland Division

\*Colloquial Name: Brazilian-Parana Xeromorphic Scrub & Grassland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M779 | Caatinga Dense Scrub & Forb Meadow |
| M778 | Caatinga Xeromorphic Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.El. Brazilian-Parana Xeromorphic Scrub & Grassland

M779. Caatinga Dense Scrub & Forb Meadow

Type Concept Sentence: Shrubby communities of the Brazilian Caatinga, characterized by the presence of columnar cacti, bromeliads, and other annual and perennial forbs. Occur on the tops and cliff edges of table-like formations near the San Francisco River in a dry area with deep, sandy substrates that originated from erosion and sediments left by the river.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.El. Brazilian-Parana Xeromorphic Scrub & Grassland (D292)

Elcode: M779

\*Scientific Name: Caatinga Dense Scrub & Forb Meadow Macrogroup

\*Common (Translated Scientific) Name: Caatinga Dense Scrub & Forb Meadow Macrogroup

\*Colloquial Name: Caatinga Dense Scrub & Forb Meadow

\*Type Concept: This macrogroup includes shrubby communities of the Brazilian Caatinga, characterized by the presence of columnar cacti, bromeliads, and other annual and perennial forbs. It occurs on the tops and cliff edges of table-like formations near the San Francisco River in a dry area with deep, sandy substrates that originated from erosion and sediments left by the river.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2016)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.El. Brazilian-Parana Xeromorphic Scrub & Grassland

M778. Caatinga Xeromorphic Scrub

Type Concept Sentence: Xerophytic, low thorn forests that constitute the main Caatinga woodland type that are made up of profusely branched, spiny trees that remain leafless for long periods. These forests are found on deep soils originating from the crystalline basement canopy, and height ranges up to 7-15 m. The main tree components, many of which store water in their trunks or modified root systems, include *Aspidosperma pirifolium, Astronium urundeuva, Bursera leptophloeos, Caesalpinia pyramidalis, Cereus* spp., *Schinopsis brasiliensis, Spondias tuberosa*, and the palm *Syagrus coronata*. Also included are xerophytic deciduous shrublands growing on shallow soils of the crystalline rock outcrops accompanied by cacti and terrestrial bromeliads. Dominant species belong to the genera *Aspidosperma, Caesalpinia, Croton, Jatropha, Mimosa*, and *Pilosocereus*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.El. Brazilian-Parana Xeromorphic Scrub & Grassland (D292)

Elcode: M778

\*Scientific Name: Caatinga Xeromorphic Scrub Macrogroup

\*Common (Translated Scientific) Name: Caatinga Xeromorphic Scrub Macrogroup

\*Colloquial Name: Caatinga Xeromorphic Scrub

\*Type Concept: Deciduous, xerophytic, low thorn forests which constitute the main Caatinga woodland type. They are formed by profusely branched, spiny trees with tortuous trunks and leafless for long periods, with a canopy reaching up to 7-15 m developed on deep soils originated from the crystalline basement. The main tree components, many of which store water in their trunks or modified root systems, include *Schinopsis brasiliensis, Astronium urundeuva, Spondias tuberosa, Bursera leptophloeos, Caesalpinia pyramidalis, Aspidosperma pirifolium*, the palm *Syagrus coronata*, and cacti *Cereus* spp. Also in this macrogroup are included xerophytic deciduous shrublands growing on shallow soils of the crystalline rock outcrops accompanied by cacti and terrestrial bromeliads. Dominant species belong to the genera *Caesalpinia, Aspidosperma, Croton, Mimosa, Jatropha*, and *Pilosocereus*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.Em. Chaco Xeromorphic Scrub, Grassland & Savanna

D293. Chaco Xeromorphic Scrub, Grassland & Savanna

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.A.2.Em. Warm Desert & Semi-Desert Scrub & Grassland (F015)

Elcode: D293

\*Scientific Name: Chaco Xeromorphic Scrub, Grassland & Savanna Division

\*Common (Translated Scientific) Name: Chaco Xeromorphic Scrub, Grassland & Savanna Division

\*Colloquial Name: Chaco Xeromorphic Scrub, Grassland & Savanna

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M141 | Chaco Xeromorphic Cliff & Other Rock Vegetation |
| M781 | Southern Chaco Xeromorphic Scrub & Savanna |
| M780 | Northern Chaco Xeromorphic Scrub & Savanna |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-05-10 | D127 Chacoan Shrubland & Savanna Division | D127 replaced by D293 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.Em. Chaco Xeromorphic Scrub, Grassland & Savanna

M141. Chaco Xeromorphic Cliff & Other Rock Vegetation

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Em. Chaco Xeromorphic Scrub, Grassland & Savanna (D293)

Elcode: M141

\*Scientific Name: Chaco Xeromorphic Cliff & Other Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Chaco Xeromorphic Cliff & Other Rock Vegetation Macrogroup

\*Colloquial Name: Chaco Xeromorphic Cliff & Other Rock Vegetation

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-03 | D315 Chaco Xeromorphic Cliff & Other Rock Vegetation Division | D315 concept moved under D293 as new M141 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.Em. Chaco Xeromorphic Scrub, Grassland & Savanna

M781. Southern Chaco Xeromorphic Scrub & Savanna

Type Concept Sentence: Open savannas with scattered trees and parkland savannas growing on poorly drained to moderately drained rolling plains, respectively, of the lower Uruguay River basin. Common trees on poorly drained soils are *Acacia caven, Aspidosperma quebracho-blanco*, and *Geoffroea decorticans*, whereas on parkland savannas the dominant trees are *Prosopis affinis* or *Prosopis nigra*. There are also several accompanying shrub species, vines, forbs, cacti and grasses. Also included are treed savannas growing on well-drained, sandy banks of the Pilcomayo River in the Chaco region of Paraguay and Argentina. Typical tree species of this community are *Acacia aroma, Astronium fraxinifolium, Jacaranda cuspidifolia*, and *Schinopsis heterophylla*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Em. Chaco Xeromorphic Scrub, Grassland & Savanna (D293)

Elcode: M781

\*Scientific Name: Southern Chaco Xeromorphic Scrub & Savanna Macrogroup

\*Common (Translated Scientific) Name: Southern Chaco Xeromorphic Scrub & Savanna Macrogroup

\*Colloquial Name: Southern Chaco Xeromorphic Scrub & Savanna

\*Type Concept: This macrogroup represents open savannas with very scattered trees to parkland physiognomies growing respectively on poorly drained to moderately drained rolling plains of the lower Uruguay River basin. The trees species are of Chaquean floristic affinity. Soil characteristics vary depending on the hydrologic conditions. On poorly drained soils the common trees are *Acacia caven, Aspidosperma quebracho-blanco, Geoffroea decorticans*, while on parkland savannas the dominants are *Prosopis affinis* or *Prosopis nigra*. Besides the trees there are several accompanying shrub species, vines, forbs, cacti and grasses, including *Agrostis montevidensis, Bothriochloa laguroides, Bouteloua megapotamica, Bromelia serra, Bromus catharticus, Carex bonariensis, Chaptalia ignota, Cienfuegosia sulfurea, Cuphea fruticosa, Dichondra sericea var. tomentosa, Elephantopus mollis, Eleusine indica, Eragrostis neesii var. neesii, Evolvulus sericeus, Leptochloa virgata, Nassella neesiana, Nierembergia linariaefolia, Panicum bergii, Paspalum notatum*, among many others. Included in the macrogroup are similar treed savannas growing in the well-drained, sandy paleochannels of the Pilcomayo River in the Chaco region of Paraguay and Argentina. Typical tree species of this community are *Schinopsis heterophylla, Jacaranda cuspidifolia, Astronium fraxinifolium*, and *Acacia aroma*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, PY, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-01-17 | M352 Northern Chaco Shrubland & Savanna Macrogroup | M352 reconfigured into M732, M780, M781 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.Em. Chaco Xeromorphic Scrub, Grassland & Savanna

M780. Northern Chaco Xeromorphic Scrub & Savanna

Type Concept Sentence: Semi-open shrublands formed by thorny, woody species and accompanied by abundant cacti and growing on well-drained, sandy alluvial plains of the northwestern Chaco in Bolivia, Paraguay, and northern Argentina. Characteristic species are *Acacia aroma, Acacia furcatispina, Capparis speciosa, Cercidium praecox, Mimosa detinens, Opuntia paraguayensis, Piptadeniopsis lomentifera, Pithecellobium chacoense, Senna chloroclada*, and *Stetsonia coryne*. Also includes stabilized dune communities of fluvial origin that have an open layer of grasses and forbs, cacti, and scattered shrubs and short trees including *Schinopsis cornuta, Hexachlamys edulis*, and *Astronium fraxinifolium*. These communities include several annuals, and their true extent is visible during the rainy season.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Em. Chaco Xeromorphic Scrub, Grassland & Savanna (D293)

Elcode: M780

\*Scientific Name: Northern Chaco Xeromorphic Scrub & Savanna Macrogroup

\*Common (Translated Scientific) Name: Northern Chaco Xeromorphic Scrub & Savanna Macrogroup

\*Colloquial Name: Northern Chaco Xeromorphic Scrub & Savanna

\*Type Concept: These are semi-open shrublands and woodlands, usually formed by thorny species, accompanied by abundant cacti species. These grow on well-drained, sandy alluvial plains of the northwestern Chaco biogeographic region in Bolivia, Paraguay and northern Argentina. Characteristic species are *Acacia furcatispina, Acacia aroma, Mimosa detinens, Senna chloroclada, Cercidium praecox, Pithecellobium chacoense, Opuntia paraguayensis, Opuntia retrorsa, Stetsonia coryne, Castela coccinea, Capparis speciosa*, and *Piptadeniopsis lomentifera*. The macrogroup also includes more-or-less established eolian dune communities of fluvial origin formed by an open layer of grasses and forbs adapted to xeric conditions, including cacti, and scattered shrubs and short trees. These communities include several annuals and their true extent is visible during the rainy season. Among the trees and shrubs, characteristic species are *Schinopsis cornuta, Hexachlamys edulis, Astronium fraxinifolium, Jacaranda cuspidifolia, Tabebuia aurea*, and *Senna chloroclada*, accompanied by *Gymnocalycium marsoneri, Melochia* sp., *Gaya tarijensis, Richardia scabra, Rhynchosia burkartii, Aristida mendocina, Arachis batizocoi, Galactia latisiliqua, Indigofera parodiana, Pappophorum krapovickasii*, and species of *Axonopus, Paspalum, Eragrostis, Borreria, Ipomoea, Chamaecrista, Crotalaria, Chloris, Digitaria, Bothriochloa*, and *Andropogon*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, PY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-03 | M859 Northern Chaco Xeromorphic Cliff & Other Rock Vegetation Macrogroup | M859 concept covered by M780 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland

D294. South American Pacific Semi-Desert Scrub & Grassland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.A.2.En. Warm Desert & Semi-Desert Scrub & Grassland (F015)

Elcode: D294

\*Scientific Name: South American Pacific Semi-Desert Scrub & Grassland Division

\*Common (Translated Scientific) Name: South American Pacific Semi-Desert Scrub & Grassland Division

\*Colloquial Name: South American Pacific Semi-Desert Scrub & Grassland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M784 | Chilean Mediterranean Coastal Semi-Desert Scrub & Grassland |
| M785 | Chilean Mediterranean Interior Semi-Desert Scrub & Grassland |
| M861 | Sechura Atacama Semi-Desert Cliff & Pavement |
| M782 | Sechura Atacama Semi-Desert Riparian Scrub |
| M783 | Sechura Atacama Semi-Desert Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-03 | D317 South American Pacific Semi-Desert Cliff, Scree & Pavement Sparse Vegetation Division | D317 concept covered by D294 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland

M784. Chilean Mediterranean Coastal Semi-Desert Scrub & Grassland

Type Concept Sentence: Scrub and grassland communities of the Atacama Desert, occurring from sea level to 1200 m elevation on the Chilean Coastal Range in situations with some moisture availability. They consist of thickets up to 2 m high, with columnar succulents 3-4 m-tall. Vegetation cover is 30-40%, reaching up to 80% in the most favorable situations (700-800 m elevation or the elevation at which fog forms due to the proximity to cold ocean water). Characteristic species are *Euphorbia lactiflua, Echinopsis deserticola, Eulychnia iquiquensis, Eulychnia saint-pieana, Heliotropium talatalense, Nolana crassulifolia, Nolana leptophylla, Ophryosporus triangularis, Oxalis gigantea, Proustia tipia*, and *Puya boliviensis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland (D294)

Elcode: M784

\*Scientific Name: Chilean Mediterranean Coastal Semi-Desert Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Chilean Mediterranean Coastal Semi-Desert Scrub & Grassland Macrogroup

\*Colloquial Name: Chilean Mediterranean Coastal Semi-Desert Scrub & Grassland

\*Type Concept: This macrogroup represents the plant communities that develop along the coast and up to 1200 m elevation on the Chilean Coastal Range under the hyper-desertic conditions of the Atacama Desert, only in situations with some moisture availability provided by the fog that forms thanks to the proximity of the ocean and the Coastal Range. They are shrublands and dense thickets up to 2 m high, with columnar succulents 3-4 m tall. The vegetation cover is usually 30-40% and may reach values up to 80% in the most favorable situations, which happen at about 700-800 m elevation or the optimum elevation for fog formation, so the communities get impoverished as they occur both lower or upper in the elevational gradient. Characteristic species are *Euphorbia lactiflua, Eulychnia saint-pieana, Eulychnia iquiquensis, Echinopsis fulvilanus, Echinopsis deserticola, Heliotropium talatalense, Heliotropium* spp., *Puya boliviensis, Oxalis gigantea, Proustia tipia, Nolana crassulifolia, Nolana leptophylla, Ophryosporus triangularis*, among many others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland

M785. Chilean Mediterranean Interior Semi-Desert Scrub & Grassland

Type Concept Sentence: Scrub and grassland communities that develop on the inland plains and leeward slopes of the Atacama Desert in northern Chile from 400 to 1600 m elevation. These are xeromorphic, open shrublands up to 3 m high, with a low herbaceous layer that develops during the spring of wet years. Species can remain dormant during multi-year droughts. Diagnostics species include *Adesmia argentea, Aloysia salviifolia, Aristolochia chilensis, Atriplex deserticola, Balsamocarpon brevifolium, Bulnesia chilensis, Caesalpinia angulata, Calliandra chilensis, Chuquiraga acicularis, Echinopsis coquimbanus, Encelia canescens, Frankenia chilensis, Heliotropium* spp., *Krameria cistoidea, Nolana rostrata*, and *Opuntia* spp.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland (D294)

Elcode: M785

\*Scientific Name: Chilean Mediterranean Interior Semi-Desert Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Chilean Mediterranean Interior Semi-Desert Scrub & Grassland Macrogroup

\*Colloquial Name: Chilean Mediterranean Interior Semi-Desert Scrub & Grassland

\*Type Concept: This macrogroup represents the plant communities that develop on the inland plains, leeward slopes and ridges of the Atacama Desert region in northern Chile from 400 to 1600 m elevation. The vegetation is a xeromorphic open shrubland up to 3 m high, with a low herbaceous layer that develops in the spring of wet years. The vegetation is adapted to several-year periods of complete drought during which species shed some of their external tissues and remain dormant until some moisture becomes available. Characteristic species are *Adesmia argentea, Aloysia salviifolia, Argylia radiata, Aristolochia chilensis, Balbisia peduncularis, Balsamocarpon brevifolium, Bulnesia chilensis, Caesalpinia angulata, Calliandra chilensis, Chuquiraga acicularis, Cordia decandra, Cruckschanksia pumila, Echinopsis coquimbanus, Encelia canescens, Heliotropium sinuatum, Heliotropium chenopodiaceum, Krameria cistoidea, Opuntia miquelii, Opuntia ovata, Pintoa chilensis, Pleurophora pungens, Proustia ilicifolia, Atriplex deserticola, Fagonia chilensis, Frankenia chilensis, Heliotropium myosotifolium, Nolana rostrata, Plantago hispidula, Skytanthus acutus*, and *Tetragonia angustifolia*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
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RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland

M861. Sechura Atacama Semi-Desert Cliff & Pavement

Type Concept Sentence: Zone between the coast and the Andes Mountains in the Atacama Desert of northern Chile that are almost completely absence of vascular vegetation. These areas are between 1000 and 2000 m elevation with very low or no rainfall, which can prevent the presence of plant life. Also in the Sechura Desert in south central Peru, where small patches of vegetation occur in association with topographic pockets that receive mists and support bromeliad communities (e.g., *Tillandsia* spp.) barely attached to the soil.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland (D294)

Elcode: M861

\*Scientific Name: Sechura Atacama Semi-Desert Cliff & Pavement Macrogroup

\*Common (Translated Scientific) Name: Sechura Atacama Semi-Desert Cliff & Pavement Macrogroup

\*Colloquial Name: Sechura Atacama Semi-Desert Cliff & Pavement

\*Type Concept: The intermediate zone between the coast and the Andes Mountains in the Atacama Desert in northern Chile represents the extreme of this macrogroup with almost complete absence of vascular vegetation. These areas are between 1000 and 2000 m altitude with very low or no rainfall and no influence of mists, which completely prevents the presence of plant life. Most of this zone has a relief of plains, rolling hills and mountains. Similar conditions characterize the extent of this macrogroup along the Sechura Desert in central southern Peru, where very small patches of vegetation occur associated with topographic pockets that receive mists that are used by communities of bromeliads barely attached to the soil (*Tillandsia landbeckii, Tillandsia latifolia, Tillandsia straminea, Tillandsia werdermannii*). More developed plant communities distributed along the Pacific semi-desert are included in ~Sechura Atacama Semi-Desert Riparian Scrub Macrogroup (M782)$$.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M782 | Sechura Atacama Semi-Desert Riparian Scrub |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

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\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland

M782. Sechura Atacama Semi-Desert Riparian Scrub

Type Concept Sentence: Communities formed by plants able to respond to intermittent superficial or groundwater flow that is characteristic of the western Andean slopes and lowlands of the desertic Sechura and Atacama regions from central Peru to northern Chile. The communities vary depending on the geomorphological setting, which can range from intermittent streambeds, alluvial margins of more permanent streams, or distal alluvial fans. Typical species are *Acacia macracantha, Distichlis spicata, Equisetum giganteum, Geoffroea decorticans, Heliotropium curassavicum, Lycopersicon chilense, Pluchea chingoyo, Prosopis alba, Salix humboldtiana, Tecoma fulva, Tessaria absinthioides*, and *Trixis cacalioides*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland (D294)

Elcode: M782

\*Scientific Name: Sechura Atacama Semi-Desert Riparian Scrub Macrogroup

\*Common (Translated Scientific) Name: Sechura Atacama Semi-Desert Riparian Scrub Macrogroup

\*Colloquial Name: Sechura Atacama Semi-Desert Riparian Scrub

\*Type Concept: These are communities formed by several successional species adjusted to respond to intermittent surficial or groundwater waterflow characteristic of the western Andean slopes and lowlands of the desertic Sechura and Atacama regions from central Peru to northern Chile. The communities vary based on the geomorphology setting, varying from the bed of intermittent streams to the alluvial margins of more permanent streams, or distal alluvial fans. They are composed of *Acacia macracantha, Geoffroea decorticans, Prosopis alba, Salix humboldtiana, Tessaria absinthioides, Pluchea chingoyo, Lycopersicon chilense, Heliotropium curassavicum, Distichlis spicata, Equisetum giganteum, Tecoma fulva*, and *Trixis cacalioides*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M861 | Sechura Atacama Semi-Desert Cliff & Pavement |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland

M783. Sechura Atacama Semi-Desert Scrub

Type Concept Sentence: Coastal scrub communities occurring along the central Peruvian and northern Chilean coast in an area known as the Sechura and northern Atacama deserts. Distributed along an elevational gradient, these communities experience a desertic climate with several years of minimal rainfall interrupted by occasional years of relatively high precipitation. Shrubs, cacti, forbs, and grasses make up these communities. The position of the Andes close to cold coastal water causes the formation of fog at mid elevations where certain plant communities develop, dominated by the cacti *Eulychnia, Haageocereus, Neoraimondia*, and short shrubs of the genera *Nolana, Chaetanthera, Polyachyrus*, and *Solanum*. At low elevations columnar and globular cacti dominate with interspersed shrubs such as *Schinus molle, Carica candicans, Mentzelia* spp., *Baccharis* spp., and *Nicotiana* spp.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.En. South American Pacific Semi-Desert Scrub & Grassland (D294)

Elcode: M783

\*Scientific Name: Sechura Atacama Semi-Desert Scrub Macrogroup

\*Common (Translated Scientific) Name: Sechura Atacama Semi-Desert Scrub Macrogroup

\*Colloquial Name: Sechura Atacama Semi-Desert Scrub

\*Type Concept: This macrogroup includes several communities that develop along the Pacific Coast from central Peru to northern Chile in the area known as the Sechura Desert and the northern Atacama Desert. These are open, mostly succulent, scrub communities formed by shrubs, cacti, forbs and grasses. Scattered trees only occur in some locations in the rocky slopes of the western pre-Puna, at over 2000 m elevation, or with a shallow water table. The different communities are distributed along the altitudinal gradient from the coast up to the western slopes of the Andes, subject to a desertic climate, with several years of minimal rainfall interrupted by one year of relatively high precipitation. The elevational gradient along the ocean allows for the formation of fog at mid altitudes, where certain plant communities develop, formed by *Eulychnia aricensis, Eulychnia iquiquensis, Haageocereus australis, Neoporteria islayensis, Neoraimondia arequipensis, Nolana intonsa, Nolana jaffuelii, Nolana sedifolia, Oxalis thyrsoidea, Polyachyrus annus*, and *Solanum brachyantherum*. At low elevations the dominant structure is of columnar cacti alternating with shrub and globular cacti that include *Armatocereus procerus, Cnidoscolus basiacanthus, Corryocactus brachypetalus, Espostoa melanostele, Melocactus peruvianus*, and *Neoraimondia arequipensis*. Some of the woody species at higher elevation are of Andean affinity such as *Schinus molle, Furcraea andina, Carica candicans, Mentzelia* sp., *Baccharis* sp., *Nicotiana* sp., and *Solanum* sp.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.A.2.Na. North American Warm Desert Scrub & Grassland

D039. North American Warm Desert Scrub & Grassland

Type Concept Sentence: This division contains aridland shrublands and grasslands dominated by xerophytic woody shrubs, succulents and grasses that occur among the lowland intermountain basins and foothills of desert mountain ranges across the southwestern U.S. and northern Mexico.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.A.2.Na. Warm Desert & Semi-Desert Scrub & Grassland (F015)

Elcode: D039

\*Scientific Name: *Acacia greggii - Cylindropuntia leptocaulis - Muhlenbergia porteri* North American Warm Desert Scrub & Grassland Division

\*Common (Translated Scientific) Name: Catclaw Acacia - Christmas Cholla - Bush Muhly North American Warm Desert Scrub & Grassland Division

\*Colloquial Name: North American Warm Desert Scrub & Grassland

\*Type Concept: This division is characterized by the dominance of xerophytic shrubs and grasses (and occasionally trees) that tolerate warm-temperate to subtropical arid conditions of the deserts of the southwestern U.S. and northern Mexico (Viscaino-Baja California and Mojave eastward to the Sonoran, Chihuahuan, and the Tamaulipan mattoral/mezquital of northeastern Mexico). Shrublands have sparse to moderate canopies dominated by drought-tolerant micro-microphyllous or broad-leaved species. Strong diagnostic shrubs include *Fouquieria splendens, Larrea tridentata, Acacia greggii, Prosopis glandulosa*, and *Prosopis velutina*. Moderately-diagnostic regional dominants include *Flourensia cernua, Jatropha cuneata, Leucophyllum frutescens*, and *Viguiera stenoloba* along with dwarf-shrubs such as *Ambrosia dumosa, Eriogonum fasciculatum*, and *Parthenium incanum*. Cacti and rosette stem succulents, and sarcocaulescent trees are also common. *Cylindropuntia leptocaulis* is a strong diagnostic species; others are characteristic of specific desert regions, e.g., *Agave lechuguilla, Bergerocactus emoryi, Bursera microphylla, Carnegiea gigantea, Cylindropuntia bigelovii, Cylindropuntia prolifera*, and *Yucca treculeana*. Desert grasslands are dominated by drought-tolerant, warm-season (C4) bunchgrasses. Moderately strong diagnostic grasses include *Bouteloua breviseta, Bouteloua eriopoda, Muhlenbergia porteri, Muhlenbergia setifolia, Pleuraphis mutica, Pleuraphis rigida, Sporobolus flexuosus*, and *Tridens muticus*. Other, often abundant grasses include *Bouteloua curtipendula, Bouteloua gracilis, Bouteloua hirsuta, Sporobolus airoides, Sporobolus wrightii*, and *Panicum obtusum*. While xerophytic shrubs can be conspicuous elements of desert grasslands, they typically are not dominants, e.g., *Dasylirion leiophyllum, Ephedra torreyana, Nolina microcarpa, Nolina texana*, and *Yucca elata*. Perennial forbs are diverse, but typically low in cover; annual forbs can be locally to regionally abundant in any given year depending on rainfall amounts and timing, or essentially absent (e.g., *Eschscholzia californica*). There are also grasslands that have been invaded by non-native, often aggressive species such as *Eragrostis curvula, Eragrostis lehmanniana, Pennisetum ciliare*, and *Pennisetum setaceum*. Intermixed among the grasslands and shrublands are ephemeral dry washes dominated by shrubs tolerant of high episodic stream flows; characteristic species include *Chilopsis linearis, Fallugia paradoxa, Hymenoclea monogyra*, and *Hymenoclea salsola*.

This is a division of warm-temperate to subtropical arid conditions with peak summer temperatures that can exceed 50°C and mean annual precipitation ranges from 30 to 250 (300) mm. In the higher elevation or more continental regions (Mojave and Chihuahuan), temperatures can drop below freezing for extended periods in winter. Desert grasslands are more prevalent in the eastern, summer rainfall-dominated regions (Chihuahuan and Tamaulipan) that favor the more shallow-rooted grasses during the growing season. In contrast, shrublands tend to dominate the Sonoran, Mojave, and Viscaino-Baja California deserts where the predominantly winter-rainfall regime favors shrubs that are able to access deeper stored soil moisture during the growing season. Sites extend from sea level (or below) to about 1600 m for shrublands and 2000 m for desert grasslands. The vegetation types are sorted from low-lying, broad basin bottoms with fine clay alluvial soils (including alkaline ephemeral playa lakes) up adjacent coalesced alluvial fan piedmonts (bajadas) with shallow gravelly soils and desert pavements to the colluvial foothill slopes of bordering desert mountain ranges with their cobbly and rocky soils (including sparsely vegetated cliff faces and boulder slopes). The desert basin can also have extensive sandy plains (sand sheets) and dunelands (including unique gypsum dune communities). Fire plays a role in desert grasslands (return intervals between 10 and 30 years) but has minimal impact on desert scrubs. Excessive burning of desert grasslands can also favor shrubs.

\*Diagnostic Characteristics: Aridland shrublands and grasslands are dominated by a combination of xerophytic woody shrubs and grasses, while succulents and grasses occur from basin bottoms to desert mountain foothills. Shrubs include tall and dwarf multi-stemmed woody shrubs that are microphyllous or broad-leaved, evergreen or drought-deciduous species. *Acacia greggii, Fouquieria splendens, Larrea tridentata, Prosopis glandulosa*, and *Prosopis velutina* are strong diagnostic species with *Ambrosia dumosa, Eriogonum fasciculatum, Flourensia cernua*, and *Leucophyllum frutescens* as regionally important dominants. In addition, there are cacti and rosette stem succulents, and, on occasion, sarcocaulescent trees and shrubs. *Cylindropuntia leptocaulis* and *Cylindropuntia bigelovii* are strong and moderately diagnostic species, respectively; others are regionally diagnostic: *Encelia farinosa* (Mojave), *Bursera microphylla* (Baja California), *Carnegiea gigantea* (Sonoran), *Agave lechuguilla* (Chihuahuan), and *Yucca treculeana* (Tamaulipan). The division also includes communities of ephemeral desert washes with *Chilopsis linearis, Fallugia paradoxa*, and *Hymenoclea monogyra* as the strong diagnostic dominants, along with ruderal communities dominated by invasive grasses such as *Eragrostis curvula, Eragrostis lehmanniana, Pennisetum ciliare*, and *Pennisetum setaceum*.

\*Classification Comments: Species linkages to the Tamaulipan component remain weak, and this element may need to be considered under a subtropical division in the future (e.g., 3.A.1 ~Tropical Thorn Woodland Formation (F039)$$). Brown (1982a) also considers the Sonoran subtropical, but the clear linkages to the cooler Mojave and Chihuahuan deserts preclude removing it from this division.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D010 | Western North American Pinyon - Juniper Woodland & Scrub | intersperses with D039 at higher elevations. |
| D327 | Californian Scrub & Grassland |  |
| D022 | Western North American Grassland & Shrubland | intersperses with D039 along its northeastern edge. |
| D061 | Western North American Interior Chaparral | intersperses with D039 at higher elevations. |
| D040 | Western North American Cool Semi-Desert Scrub & Grassland | shares many species with D039, particularly at the southern edge of it distribution. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This division is characterized by the dominance of xerophytic shrubs and grasses (and occasionally trees). Shrub growth forms are diverse and include tall and dwarf multi-stemmed, woody shrubs that are microphyllous or broad-leaved which can be evergreen or drought-deciduous (and some cases, cold-deciduous), and cacti and rosette stem succulents (and on occasion, sarcocaulescent trees). Thorns and spines are common, lending the term thorn scrub. Shrub-dominated desert communities are typically low in production and may form very open (10% cover) to moderately (50-66%) closed canopies, and may or may not have a significant herbaceous layer of grasses and forbs. Desert grasslands, in contrast, are dominated by drought-tolerant, often robust warm-season (C4) bunchgrasses that can range from 10% to nearly 100% in cover.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Shrub growth forms are diverse. There are tall and dwarf multi-stemmed woody shrubs that are microphyllous or broad-leaved and they can be evergreen or drought-deciduous (and some cases, cold-deciduous). Among these, *Acacia greggii (= Senegalia greggii), Fouquieria splendens, Larrea tridentata, Prosopis glandulosa*, and *Prosopis velutina* are strong diagnostic species with *Ambrosia dumosa, Eriogonum fasciculatum, Flourensia cernua, Jatropha cuneata, Leucophyllum frutescens*, and *Viguiera stenoloba* as regionally important dominants. In addition, there are cacti and rosette stem succulents, and on occasion, sarcocaulescent trees. Among these, *Cylindropuntia leptocaulis* and *Cylindropuntia bigelovii* are strong and moderately diagnostic species, respectively. Others, while restricted to the division, are common and often conspicuous elements of specific desert regions, e.g., *Bursera microphylla* (Baja California), *Carnegiea gigantea* (Sonoran), *Agave lechuguilla* (Chihuahuan), and *Yucca treculeana* (Tamaulipan). Shrub-dominated desert communities are typically low in production and may form very open canopies (10% cover) to moderately closed (50-66%) ones at best, and with or without a significant herbaceous layer of grasses and forbs.

Desert grasslands, in contrast, are dominated by drought-tolerant, warm-season (C4) bunchgrasses and can be more productive with grass cover that can range from 10% to nearly 100%. Among desert grasslands of the division, moderately strong diagnostics include *Bouteloua eriopoda, Muhlenbergia porteri, Pleuraphis mutica, Pleuraphis rigida*, and *Sporobolus flexuosus*. Xerophytic shrubs can be conspicuous and moderately diagnostic elements of the grasslands, but not the dominants, e.g., *Dasylirion leiophylla, Ephedra torreyana, Nolina texana*, and *Yucca elata*. Perennial forbs are diverse, but typically low in cover; annual forbs can be locally to regionally abundant in any given year depending on rainfall amounts and timing, or essentially absent. Desert grasslands are more prevalent in the eastern, summer rainfall-dominated regions (Chihuahuan and Tamaulipan) that favor the more shallow-rooted grasses during the growing season. In contrast, shrublands tend to dominate the Sonoran, Mojave, and Viscaino-Baja California deserts where the predominantly winter-rainfall regime favors shrubs that can access deeper stored soil moisture from the winter during the growing season.

In desert washes, strong diagnostic species include *Chilopsis linearis, Fallugia paradoxa*, and *Hymenoclea monogyra*. In addition, *Baccharis sarothroides, Brickellia laciniata, Juglans microcarpa, Prosopis velutina, Prosopis glandulosa, Rhus microphylla, Olneya tesota*, and *Parkinsonia florida* are moderately diagnostic regional species (the latter two are small trees). Lastly, where sites have been heavily disturbed or near the epicenter of the introduction of aggressive non-native noxious weeds, de-novo ruderal (weedy) communities dominated by drought-tolerant species can form. Of particular concern is the invasion of desert grasslands by perennial graminoids such as *Eragrostis curvula, Eragrostis lehmanniana, Pennisetum ciliare*, and *Pennisetum setaceum*. Annuals such as *Brassica tournefortii, Bromus rubens, Schismus arabicus*, and *Schismus barbatus* can also be problematic, particularly in winter-rainfall regions where they germinate early and can alter fire regimes later in the summer dry season.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Fire plays a role in desert grasslands (return intervals between 10 and 30 years) but has minimal impact on desert scrubs. Excessive burning of desert grasslands can also favor shrubs. However, in recent years exotic perennial and annual grasses have introduced a fire regime into the desert scrub which lacked a fire regime prior to this. These exotic grasses carry fires which burn the non-fire-adapted shrubs and small trees.

ENVIRONMENT

Environmental Description: *Climate:* This is a division of warm-temperate to subtropical arid conditions with peak summer temperatures that can exceed 50°C and mean annual precipitation ranges from 30 to 250 (300) mm. In the higher elevation or more continental regions (Mojave and Chihuahuan), temperatures can drop below freezing for extended periods in winter. Desert grasslands are more prevalent in the eastern, summer rainfall-dominated regions (Chihuahuan and Tamaulipan) that favor the more shallow-rooted grasses during the growing season. In contrast, shrublands tend to dominate the Sonoran, Mojave, and Viscaino-Baja California deserts where the predominantly winter-rainfall regime favors shrubs that are able access deeper stored soil moisture during the growing season. Sites extend from sea level (or below) to about 1600 m for shrublands and 2000 m for desert grasslands.

*Soils/substrate:* From a landscape perspective, a basin-and-range physiography forms the primary physical template for the expression of communities of the division. That is, vegetation communities are assorted from low-lying, broad basin bottoms with fine clay alluvial soils (including alkaline ephemeral playa lakes) up adjacent coalesced alluvial fan piedmonts (bajadas) with shallow gravelly soils and desert pavements to the colluvial foothill slopes of bordering desert mountain ranges with their cobbly and rocky soils (including sparsely vegetated cliff faces and boulder slopes). The desert basin can also have extensive sandy plains (sand sheets) and dunelands (including unique gypsum dune communities). The mountain ranges are composed of either fault-block uplifted sedimentary rocks (limestone and sandstone) with underlying basement granitic rocks that are sometimes exposed, or extrusive volcanics such as rhyolite. Associated with the volcanic regions are extrusive, sometimes large basaltic lava flows in the basins that also support vegetation different from those in the surrounding landscapes. Flowing through these landscape elements are ephemeral dry washes (arroyos) that support unique desert vegetation that is able to tolerate high episodic stream flows driven primarily by summer thunderstorms.

DISTRIBUTION

\*Geographic Range: This division extends from warmer deserts of the southwestern U.S. and northern Mexico from the Pacific to Atlantic oceans (Viscaino-Baja California up to the Mojave and eastward through the Sonoran and Chihuahuan deserts to the Tamaulipan mattoral/mezquital).

Nations: MX, US

States/Provinces: AZ, CA, MXBC, MXBS, MXCH, MXCO, MXDU, MXNU, MXSO, MXTM, NM, NV, TX, UT

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M130 | Tamaulipan Scrub & Grassland |
| M086 | Chihuahuan Desert Scrub |
| M087 | Chihuahuan Semi-Desert Grassland |
| M088 | Mojave-Sonoran Semi-Desert Scrub |
| M089 | Viscaino-Baja California Desert Scrub |
| M117 | North American Warm Semi-Desert Cliff, Scree & Rock Vegetation |
| M092 | North American Warm-Desert Xeric-Riparian Scrub |
| M512 | North American Warm Desert Ruderal Scrub & Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Matorral Xerofilo | Rzedowski 1978 |  |
| < | Tropical-Subtropical Desertlands | Brown 1982a |  |
| < | Tropical-Subtropical Desertlands | Brown et al. 1998 |  |
| < | Warm Deserts | MacMahon 1988 |  |
| < | Warm Temperate Desertlands | Brown et al. 1998 |  |
| < | Warm Temperate Desertlands | Brown 1982a |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J.A. MacMahon (1988)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: E. Muldavin

Acknowledgments [optional]: Todd Keeler-Wolf, Marion Reid

Version Date: 28 Oct 2015

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Brown, D. E., editor. 1982a. Biotic communities of the American Southwest-United States and Mexico. Desert Plants Special Issue 4(1-4):1-342.

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MacMahon, J. A. 1988. Warm deserts. Pages 232-264 in: M. G. Barbour and W. D. Billings, editors. North American terrestrial vegetation. Cambridge University Press, New York.

Rzedowski, J. 1978. Vegetación de México. Editorial Limusa, México D. F. 432 pp.

3. Desert & Semi-Desert

3.A.2.Na. North American Warm Desert Scrub & Grassland

M130. Tamaulipan Scrub & Grassland

Type Concept Sentence: This macrogroup is a heterogeneous assemblage of upland drought-tolerant thornscrub and grassland-savanna vegetation types of the Tamaulipan biotic region of southern Texas and northeastern Mexico that have been highly impacted by clearing and overgrazing. The thornscrub vegetation is characterized by small-leaved, thorny, woody species such as *Celtis ehrenbergiana, Prosopis glandulosa*, and many others; the grasslands include *Bothriochloa barbinodis, Trichloris pluriflora*, and many other characteristic grasses.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Na. North American Warm Desert Scrub & Grassland (D039)

Elcode: M130

\*Scientific Name: *Prosopis glandulosa - Celtis ehrenbergiana / Trichloris pluriflora* Tamaulipan Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Honey Mesquite - Spiny Hackberry / Multi-flower Rhodesgrass Tamaulipan Scrub & Grassland Macrogroup

\*Colloquial Name: Tamaulipan Scrub & Grassland

\*Type Concept: This heterogeneous vegetation assemblage of the Tamaulipan biotic region of southern Texas and northeastern Mexico combines upland drought-tolerant thornscrub with related grassland and savanna vegetation types. The thornscrub vegetation is characterized by small-leaved, thorny, woody species that range in height from 1-6 m, including *Celtis ehrenbergiana, Leucophyllum frutescens*, and *Prosopis glandulosa*, along with *Acacia berlandieri, Acacia greggii var. wrightii, Acacia rigidula, Castela erecta, Citharexylum berlandieri, Condalia hookeri, Cordia boissieri, Diospyros texana, Ehretia anacua, Eysenhardtia texana, Guaiacum angustifolium, Havardia pallens, Karwinskia humboldtiana, Leucophyllum frutescens, Cylindropuntia leptocaulis, Yucca treculeana, Zanthoxylum fagara*, and *Ziziphus obtusifolia*. Grasses are present among the shrubs, characterized by *Bothriochloa barbinodis* and *Trichloris pluriflora*, with other herbaceous species including *Bouteloua* spp., *Bouteloua dactyloides, Trichloris crinita, Heteropogon contortus, Hilaria belangeri, Pappophorum bicolor, Schizachyrium scoparium*, and *Setaria* spp. These same species constitute the components of the related grassland vegetation types of this region. This vegetation has been highly impacted by clearing and overgrazing. Few high-quality examples remain.

\*Diagnostic Characteristics: This macrogroup is characterized by thornscrub and grasslands occupying dry uplands in the Tamaulipan region of southern Texas and northeastern Mexico.

\*Classification Comments: Both ~Tamaulipan Dry Mesquite & Thornscrub Group (G099)$$ and ~Tamaulipan Dry Grassland Group (G100)$$ are floristically variable, and some of their components may be better classified with related subtropical vegetation, and others with related temperate vegetation. More data, analysis, and review are needed to discern how to best classify this vegetation, its natural process and threats (Reid et al. 1990, Fowler et al. 2011). This vegetation has been highly impacted by clearing, overgrazing, disruption of natural processes, and invasive species (Jahrsdoerfer and Leslie 1988, Manzano and Navar 2000, Fulbright 2001, Ewing and Best 2004, Foroughbakhch et al. 2014). Little data on high-quality examples exist on which to base this classification. As currently described, the groups that constitute this macrogroup (M130) do not include the savanna/scrub woodland vegetation (~Texas Live Oak - Wax Mallow Motte & Coastal Forest Group (G799)$$) of the South Texas Sand Plain that is characterized by woody mottes of *Prosopis glandulosa* and *Quercus fusiformis* along with many shrub and grass species shared with ~Tamaulipan Dry Mesquite & Thornscrub Group (G099)$$ and ~Tamaulipan Dry Grassland Group (G100)$$; ~Tamaulipan Saline Thornscrub (CES301.711)$$ occurs in this macrogroup and is currently represented by one association, ~*Varilla texana - Castela erecta ssp. texana - Isocoma coronopifolia / Hilaria belangeri* Shrubland (CEGL007763)$$, which is included in G099.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This vegetation ranges in physiognomy from low dense shrublands to open short woodlands (<6 m tall) (Bray 1901) to perennial grasslands that may occur in a mosaic with patches of thornscrub species. It also varies in canopy closure and height. It is also adapted for xeric conditions and many species have semi-tropical to tropical affinities.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The thornscrub phase of this vegetation, ~Tamaulipan Dry Mesquite & Thornscrub Group (G099)$$, is characterized by small-leaved, thorny, woody species that range in height from 1-6 m, including *Celtis ehrenbergiana (= Celtis pallida), Leucophyllum frutescens*, and *Prosopis glandulosa*, along with *Acacia berlandieri, Acacia greggii var. wrightii (= Acacia wrightii), Acacia rigidula, Aloysia gratissima, Castela erecta, Citharexylum berlandieri, Condalia hookeri, Cordia boissieri, Diospyros texana, Ehretia anacua, Eysenhardtia texana, Guaiacum angustifolium (= Porlieria angustifolia), Havardia pallens, Karwinskia humboldtiana, Leucophyllum frutescens, Cylindropuntia leptocaulis (= Opuntia leptocaulis), Yucca treculeana, Zanthoxylum fagara*, and *Ziziphus obtusifolia*. Grasses are present among the shrubs, characterized by *Bothriochloa barbinodis* and *Trichloris pluriflora (= Chloris pluriflora)*, with other herbaceous species including *Bouteloua* spp., *Bouteloua dactyloides (= Buchloe dactyloides), Trichloris crinita (= Chloris crinita), Heteropogon contortus, Hilaria belangeri, Pappophorum bicolor, Schizachyrium scoparium*, and *Setaria* spp. These same species constitute the components of the related grassland vegetation of this region, ~Tamaulipan Dry Grassland Group (G100)$$. Other woody scrub species present may include *Ebenopsis ebano, Sideroxylon lanuginosum*, and *Cordia boissieri*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: More data, analysis, and review are needed to document and understand the natural process and threats of this vegetation (Reid et al. 1990, Fowler et al. 2011).

ENVIRONMENT

Environmental Description: This vegetation is found in semi-arid and subtropical southern Texas over a variety of soil depths and textures. Rainfall is highly variable both spatially and temporally and can range from 38 to 76 cm (15-30 inches) annually in a given locality, but all areas are prone to drought and water deficits (Bray 1901, Gilbert 1982, Jahrsdoerfer and Leslie 1988).

DISTRIBUTION

\*Geographic Range: This vegetation occurs in the central and southern part of the Tamaulipan biotic region of Texas and Mexico.

Nations: MX, US

States/Provinces: MXCO, MXNU, MXTM, TX

USFS Ecoregions (2007) [optional]: 315E:CC, 321A:CC, 321B:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]: Classification of this vegetation is based on limited information and data. More data, analysis, and review are needed to better classify this vegetation.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G099 | Tamaulipan Dry Mesquite & Thornscrub |
| G100 | Tamaulipan Dry Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Eastern Coastal Plain Scrub | Muller 1939 |  |
| >< | Mesquite - Granjeno - Acacia (728) | Shiflet 1994 |  |
| >< | Mesquite-Acacia-Andropogon-Setaria Savanna | Küchler 1964 |  |
| >< | Piedmont Scrub | Muller 1939 |  |
| = | Rio Grande Chaparral | Bray 1901 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: J. Teague and K. Schultz, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: M. Pyne and J. Teague

Acknowledgments [optional]:

Version Date: 10 Jun 2015

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3. Desert & Semi-Desert

3.A.2.Na. North American Warm Desert Scrub & Grassland

M086. Chihuahuan Desert Scrub

Type Concept Sentence: This widespread Chihuahuan Desert scrub macrogroup has a moderate to sparse xeromorphic shrub layer frequently dominated by diagnostic species *Acacia constricta, Acacia neovernicosa, Flourensia cernua, Larrea tridentata, Prosopis glandulosa*, or *Prosopis velutina*. Stands may be dominated by a single species or be mixed, composed of a variety of desert scrub, thornscrub, stem rosette and succulent species present to codominant.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Na. North American Warm Desert Scrub & Grassland (D039)

Elcode: M086

\*Scientific Name: *Larrea tridentata - Flourensia cernua - Prosopis* spp. Chihuahuan Desert Scrub Macrogroup

\*Common (Translated Scientific) Name: Creosotebush - American Tarwort - Mesquite species Chihuahuan Desert Scrub Macrogroup

\*Colloquial Name: Chihuahuan Desert Scrub

\*Type Concept: This widespread Chihuahuan Desert scrub macrogroup has a moderate to sparse xeromorphic shrub layer frequently dominated by diagnostic species *Acacia constricta, Acacia neovernicosa, Flourensia cernua, Larrea tridentata, Prosopis glandulosa*, or *Prosopis velutina*. Stands may be dominated by a single species or be mixed, composed of a variety of desert scrub, thornscrub, stem rosette and succulent species present to codominant. Characteristic species may include *Acacia greggii, Agave lechuguilla, Aloysia wrightii, Artemisia filifolia, Atriplex canescens, Baccharis pteronioides, Bernardia obovata, Dasylirion leiophyllum, Euphorbia antisyphilitica, Ephedra torreyana, Ephedra trifurca, Ferocactus* spp., *Fouquieria splendens, Jatropha dioica, Koeberlinia spinosa, Krameria erecta, Leucophyllum minus, Lycium* spp., *Mimosa aculeaticarpa var. biuncifera, Mortonia scabrella, Opuntia engelmannii, Cylindropuntia imbricata, Grusonia schottii, Cylindropuntia spinosior, Parthenium incanum, Poliomintha incana, Rhus microphylla, Viguiera stenoloba, Yucca elata*, and *Yucca torreyi*. Many stands lack a herbaceous understory layer and develop a pebbly desert pavement on the soil surface sometimes with scattered grasses and forbs. If present, the understory is a sparse to moderately dense herbaceous layer dominated by graminoids. Grasses are common but generally have lower cover than shrubs. Associated graminoid species may include *Bothriochloa barbinodis, Bouteloua curtipendula, Bouteloua eriopoda, Bouteloua gracilis, Bouteloua hirsuta, Bouteloua ramosa, Dasyochloa pulchella, Muhlenbergia porteri, Muhlenbergia setifolia, Pleuraphis mutica, Scleropogon brevifolius, Setaria leucopila*, and *Sporobolus flexuosus*. Forb species are often present, but have low cover. Stands occur in the broad desert basins and plains extending up onto dissected gravelly alluvial fans and piedmonts (bajadas), and foothills in the Chihuahuan Desert below the chaparral zone. Elevation ranges from 1000-2000 m. Substrates include coarse-textured loams on well-drained, gravelly plains and slopes with typically non-saline, and frequently calcareous soils, often with a petrocalcic layer and derived from limestone, or to a lesser degree igneous rocks. However, substrates are variable and include sandy plains, coppice dunes and sandsheets that often occur on the leesides of large playas in basins where sand accumulates. Soils are fine-textured, often saline (silts, clay loams and clays) on alluvial flats and around playas, as well as in river floodplains. Stands can extend upslope on to colluvial slopes with cobbly skeletal soils.

\*Diagnostic Characteristics: This widespread Chihuahuan desert scrub macrogroup has a moderate to sparse xeromorphic shrub layer frequently dominated by diagnostic species *Acacia constricta, Acacia neovernicosa, Flourensia cernua, Larrea tridentata, Prosopis glandulosa*, or *Prosopis velutina*. Stands may be dominated by a single species or be mixed, composed of a variety of desert scrub, thornscrub, stem rosette and succulent species present to codominant. Characteristic species, both diagnostic and dominant, may include *Acacia greggii, Agave lechuguilla, Aloysia wrightii, Artemisia filifolia, Atriplex canescens, Baccharis pteronioides, Bernardia obovata, Dasylirion leiophyllum, Euphorbia antisyphilitica, Ephedra torreyana, Ephedra trifurca, Ferocactus* spp., *Fouquieria splendens, Jatropha dioica, Koeberlinia spinosa, Krameria erecta, Leucophyllum minus, Lycium* spp., *Mimosa aculeaticarpa var. biuncifera, Mortonia scabrella, Opuntia engelmannii, Cylindropuntia imbricata, Grusonia schottii, Cylindropuntia spinosior, Parthenium incanum, Poliomintha incana, Rhus microphylla, Viguiera stenoloba, Yucca elata*, and *Yucca torreyi*. See also Brown (1982b) for a list of diagnostic species. Only lowland mesquite-dominated shrublands are included in this macrogroup as upland mesquite-dominated shrublands are considered ruderal and were moved to ~North American Warm Desert Ruderal Scrub & Grassland Macrogroup (M512)$$.

\*Classification Comments: This broadly defined desert scrub macrogroup forms the matrix vegetation of the Chihuahuan Desert. During the last century, the area occupied by this macrogroup has increased dramatically through conversion of desert grasslands as a result of drought, overgrazing and seed dispersion by livestock, and/or decreases in fire frequency (Buffington and Herbel 1965, Herbel et al. 1972, Humphrey 1974, McLaughlin and Bowers 1982, Gibbens et al. 1983, Hennessy et al. 1983, Schlesinger et al. 1990, McPherson 1995). The upland mesquite-dominated shrublands formerly included in this macrogroup were moved to ~North American Warm Desert Ruderal Scrub & Grassland Macrogroup (M512)$$ so the only remaining mesquite-dominated shrublands in this macrogroup occur in lowlands in ~Chihuahuan Desert Lowland Basin Scrub Group (G299)$$.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M076 | Warm Desert Lowland Freshwater Marsh, Wet Meadow & Shrubland |  |
| M088 | Mojave-Sonoran Semi-Desert Scrub | is desert scrub that is often dominated by *Larrea tridentata*, but lacks diagnostic Chihuahuan Desert species. |
| M087 | Chihuahuan Semi-Desert Grassland | may have similar species composition, but stands are grasslands or shrub-steppe and are characterized by a prominent perennial graminoid layer. |
| M093 | Great Basin Saltbush Scrub |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The vegetation in this macrogroup has a moderate to sparse (<10% cover on extremely xeric sites) short-shrub layer (<2 m tall) of xeromorphic evergreen or deciduous, and/or succulent species, especially cacti, yucca, and agave. Understory dwarf-shrub and herbaceous layers and emergent tall shrubs may be absent or present. If present, the herbaceous layer has variable cover ranging from sparse (<10% cover) to fairly dense (>50% cover) and is often patchy. It is usually dominated by perennial graminoids, especially bunch grasses, with low cover of forbs.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This Chihuahuan Desert scrub macrogroup has a moderate to sparse short-shrub layer (<10% cover on extremely xeric sites). *Larrea tridentata* is the most common dominant species, often covering entire landscapes in near-monotypic stands. Stands can also be codominated or dominated by a mix of thornscrub and other desert scrub species such as *Agave lechuguilla, Aloysia wrightii, Artemisia filifolia, Baccharis pteronioides, Bernardia obovata, Dasylirion leiophyllum, Euphorbia antisyphilitica, Ferocactus* spp., *Fouquieria splendens, Jatropha dioica, Koeberlinia spinosa, Krameria erecta, Leucophyllum minus, Lycium* spp., *Mimosa aculeaticarpa var. biuncifera, Mortonia scabrella (= Mortonia sempervirens ssp. scabrella), Opuntia engelmannii, Cylindropuntia imbricata (= Opuntia imbricata), Grusonia schottii (= Opuntia schottii), Cylindropuntia spinosior (= Opuntia spinosior), Parthenium incanum, Prosopis glandulosa, Prosopis velutina, Rhus microphylla* (in ephemeral washes), *Viguiera stenoloba*, and *Yucca* spp. (Brown 1982b, MacMahon and Wagner 1985, Henrickson and Johnston 1986, MacMahon 1988, Dick-Peddie 1993). In the southern Chihuahuan Desert, stands are dominated by *Larrea tridentata* with *Agave parryi (= Agave scabra), Cylindropuntia kleiniae (= Opuntia kleiniae), Cylindropuntia imbricata*, and *Yucca filifera* (Huerta-Martínez et al. 2004). Stands of thornscrub dominated by *Acacia constricta, Acacia neovernicosa*, or *Acacia greggii* are included in this macrogroup, and can be especially prolific on limestone substrates (but not always). Sandy sites are often dominated or codominated by *Artemisia filifolia, Atriplex canescens, Ephedra torreyana, Ephedra trifurca, Gutierrezia sarothrae, Poliomintha incana, Prosopis* spp., *Rhus microphylla*, and *Yucca elata*. Lowland sites are often dominated by *Atriplex canescens* or *Flourensia cernua*, but under more saline conditions, *Allenrolfea occidentalis, Sarcocornia utahensis, Suaeda moquinii, Tidestromia carnosa*, or other halophytic plants may be present to codominant. The widespread, invasive *Prosopis glandulosa* may also be present to dominant in these lowland sites. Many stands lack a herbaceous understory layer and develop a pebbly desert pavement on the soil surface sometimes with scattered grasses and forbs. If present, the understory is a sparse to moderately dense herbaceous layer dominated by graminoids. Grasses are common but generally have lower cover than shrubs. Associated graminoid species may include *Bothriochloa barbinodis, Bouteloua curtipendula, Bouteloua gracilis, Bouteloua hirsuta, Bouteloua ramosa, Dasyochloa pulchella, Muhlenbergia porteri, Muhlenbergia setifolia, Pleuraphis mutica, Scleropogon brevifolius*, and *Setaria leucopila*. On sandy sites, *Achnatherum hymenoides, Bouteloua eriopoda, Muhlenbergia pungens*, and *Sporobolus flexuosus* are common. Graminoid species on often saline, bottomland sites may include *Distichlis spicata, Panicum obtusum, Pleuraphis mutica, Scleropogon brevifolius*, and *Sporobolus airoides*. Forb species are often present, but have low cover.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: In the U.S., much of this desert scrubland is thought to be a result of recent expansion of *Larrea tridentata* sometimes with *Prosopis glandulosa* into former desert grasslands and steppe in the last 150 years as a result of a combination of drought, overgrazing by livestock, wind and water erosion, and/or decreases in fire over the last 70-250 years from fire suppression and fine-fuel removal by livestock, and changes in the seasonal distribution of precipitation (Buffington and Herbel 1965, Herbel et al. 1972, Humphrey 1974, Ahlstrand 1979, McLaughlin and Bowers 1982, Gibbens et al. 1983, Hennessy et al. 1983, Donart 1984, Brown and Archer 1987, Schlesinger et al. 1990, Dick-Peddie 1993, McPherson 1995, Gibbens et al. 2005). Seed dispersion by livestock is an additional factor in the increase of *Prosopis glandulosa* (Brown and Archer 1987). It is believed that *Prosopis glandulosa* stands formerly occurred in relatively minor amounts and were largely confined to drainages until cattle distributed seed upland from the bosques into desert grasslands (Brown and Archer 1987, 1989). This macrogroup also includes invasive *Flourensia cernua* shrublands that occur in former (degraded) tobosa (*Pleuraphis mutica*) flats and loamy plains. Presence of *Scleropogon brevifolius* is common in these invasive stands. Dick-Peddie (1993) suggested that absence of *Flourensia cernua* as codominant and presence of *Dasyochloa pulchella, Acourtia nana*, and *Yucca elata* may be indicators of recent conversion of desert grasslands into desert scrub, but more research is needed. Conversely, sparse understory *Larrea tridentata* shrublands on remnant early Holocene erosional surfaces often with shallow calcareous soils and desert pavement may indicate pre-historic distributions of *Larrea tridentata* desert scrub in the Chihuahuan Desert (Stein and Ludwig 1979, Muldavin et al. 2000b).

Historical natural-ignition fires were relatively small, probably 10-15 acres in size. Repeated fire is thought to help maintain a general mosaic pattern between open grassland and shrub-dominated areas (Johnston 1963). Wright et al. (1976) found that *Prosopis glandulosa* is very fire-tolerant when only 3 years old. Most plants resprout after being top-killed by fire. Thus, prior to livestock grazing reducing fire frequency, repeated grassland fires probably maintained lower stature of shrubs and prevented new establishment by killing seedlings.

Drought is a relatively common occurrence in this desert scrub, generally occurring every 10-15 years and lasting 2-3 years with occasional long-term drought periods (10-15 years duration). *Prosopis* spp. and other shrubs have extensive root systems that allow them to exploit deep-soil water that is unavailable to shallower rooted grasses and cacti (Burgess 1995). This strategy works well, especially during drought. However, on sites that have well-developed argillic or calcic soil horizons that limit infiltration and storage of winter moisture in the deeper soil layers, *Prosopis* spp. invasion can be limited to a few, small individuals (McAuliffe 1995). This has implications in plant geography and desert grassland restoration work in the southwestern United States.

ENVIRONMENT

Environmental Description: This macrogroup includes the extensive desert scrub that occurs in the broad desert basins and flats to gently sloping alluvial plains extending up onto dissected gravelly alluvial fans and moderately steep piedmont slopes (bajadas), and foothills in the Chihuahuan Desert below the chaparral zone (Brown 1982b, MacMahon and Wagner 1985, Henrickson and Johnston 1986, MacMahon 1988, Dick-Peddie 1993, Muldavin et al. 2000b). Elevation ranges from 1000-2000 m.

*Soil/substrate/hydrology:* Substrates frequently include coarse-textured loams on well-drained, gravelly plains and slopes with, typically non-saline, and frequently calcareous soils, often with a petrocalcic layer and derived from limestone, or to a lesser degree igneous rocks. However, substrates are variable and include sandy plains, coppice dunes and sandsheets that often occur on the leesides of large playas in basins where sand accumulates. Soils are fine-textured, often saline (silts, clay loams and clays) on alluvial flats and around playas, as well as in river floodplains. Here water tables are generally shallow but may fluctuate within reach of deep-rooted plants, and in most places is high enough that salts accumulate on the surface of the soil (Brown 1982b, MacMahon and Wagner 1985, Henrickson and Johnston 1986, MacMahon 1988, Dick-Peddie 1993). Stands can extend upslope on to colluvial slopes with cobbly skeletal soils (Muldavin et al. 2000b).

DISTRIBUTION

\*Geographic Range: This desert scrub macrogroup forms the matrix vegetation in the Chihuahuan Desert and extends north up Rio Grande river valley and south into northern Mexico.

Nations: MX, US

States/Provinces: AZ, MXCH, MXCO, MXDU, MXNU, MXSO, NM, TX

USFS Ecoregions (2007) [optional]: 313B:CP, 313C:CC, 315A:CC, 315B:CC, 315H:CC, 321A:CC, 322A:CC, 322B:CC, 322C:CP, M313A:CC, M313B:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G288 | Chihuahuan Creosotebush - Mixed Desert Scrub |
| G299 | Chihuahuan Desert Lowland Basin Scrub |
| G287 | Chihuahuan Desert Sand Scrub |
| G286 | Chihuahuan Desert Succulent Scrub |
| G847 | Chihuahuan Gypsophilous Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Chihuahuan Deciduous Desert Scrub | Wood et al. 1999 |  |
| < | Chihuahuan Deciduous Desert Scrub | Muldavin et al. 1998d |  |
| < | Chihuahuan Desert Scrub (*Larrea* Scrub Phase) | Henrickson and Johnston 1986 |  |
| < | Chihuahuan Desert Scrub (Mixed Desert Scrub Phase) | Henrickson and Johnston 1986 |  |
| = | Chihuahuan Desertscrub | Brown et al. 1979 |  |
| = | Chihuahuan Desertscrub - 153 | Brown et al. 1979 |  |
| = | Chihuahuan Desertscrub - 153.2 | Brown et al. 1998 |  |
| < | Chihuahuan Desertscrub, Creosotebush-Tarbush Series - 153.21 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Creosotebush-Tarbush Series - 153.21 | Brown et al. 1998 |  |
| < | Chihuahuan Desertscrub, Creosotebush-Tarbush Series, *Flourensia cernua* Association - 153.214 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Creosotebush-Tarbush Series, *Larrea divaricata-Flourensia cernua* Association - 153.213 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Creosotebush-Tarbush Series, *Larrea divaricata-Parthenium incanum*-Mixed Scrub Association - 153.212 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Mesquite Series - 153.24 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Mesquite Series - 153.24 | Brown et al. 1998 |  |
| < | Chihuahuan Desertscrub, Mesquite Series, *Prosopis juliflora glandulosa - Artemisia filifolia* Association - 153.242 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Mesquite Series, *Prosopis juliflora glandulosa* (shrub hummock) Association - 153.241 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Mixed Scrub - Succulent - 153.25 | Brown et al. 1998 |  |
| < | Chihuahuan Desertscrub, Mixed Scrub Series - 153.26 | Brown et al. 1979 |  |
| >< | Chihuahuan Desertscrub, Mixed Scrub Series, *Fouquieria splendens*-Mixed Scrub Association - 153.261 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Mixed Shrub Series, *Psorothamnus scoparius - Artemisia filifolia - Atriplex canescens* / Mixed Grass-Forb type | Dick-Peddie 1993 |  |
| < | Chihuahuan Desertscrub, Mixed Shrub Series, *Psorothamnus scoparius - Artemisia filifolia - Oryzopsis hymenoides - Sporobolus* spp. type | Dick-Peddie 1993 |  |
| < | Chihuahuan Desertscrub, Saltbush Series - 153.26 | Brown et al. 1998 |  |
| < | Chihuahuan Desertscrub, Saltbush Series - 153.27 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Saltbush Series, *Atriplex canescens* Association - 153.272 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Saltbush Series, *Suaeda torreyana* Association - 153.271 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Sandpaperbush Series - 153.23 | Brown et al. 1998 |  |
| < | Chihuahuan Desertscrub, Sandpaperbush Series - 153.23 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Sandpaperbush Series, *Mortonia scabrella-Rhus microphylla* Association - 153.232 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Sandpaperbush Series, *Mortonia scabrella* Association - 153.231 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Succulent Series - 153.25 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Succulent Series, *Agave lechuguilla-Yucca* spp. Association - 153.252 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Succulent Series, *Agave lechuguilla* Association - 153.251 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Succulent Series, *Opuntia* spp.-*Agave* spp.-*Larrea divaricata* Association - 153.253 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Whitethorn Series - 153.22 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Whitethorn Series - 153.22 | Brown et al. 1998 |  |
| < | Chihuahuan Desertscrub, Whitethorn Series, *Acacia neovernicosa-Larrea divaricata* Association - 153.222 | Brown et al. 1979 |  |
| < | Chihuahuan Desertscrub, Whitethorn Series, *Acacia neovernicosa* Association - 153.221 | Brown et al. 1979 |  |
| < | Creosotebush - Tarbush (508) | Shiflet 1994 |  |
| >< | Grama -Muhly - Threeawn (713) | Shiflet 1994 |  |
| < | Grama Grass - Scrub Series - 143.11 | Brown et al. 1979 |  |
| < | Grama Grass - Scrub Series, *Bouteloua eriopoda-Prosopis juliflora* Association - 143.112 | Brown et al. 1979 |  |
| < | MLRA 42 - Southern Desertic Basin (SD-1) Deep Sand | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-1) Loamy | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-1) Sandy | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-2) Deep Sand | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-2) Gravelly | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-2) Gravelly Loam | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-2) Gravelly Sand | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-2) Limestone Hills | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-2) Limy | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-2) Loamy | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-2) SD2 Hills | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-2) SD2 Malpais | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-2) Sandy | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-3) Loamy | NRCS 2006a |  |
| < | MLRA 42 - Southern Desertic Basin (SD-4) Loamy | NRCS 2006a |  |
| >< | Mesquite (729) | Shiflet 1994 |  |
| < | Mesquite (western type): 242 | Eyre 1980 |  |
| < | Mixed Grass - Scrub Series - 143.15 | Brown et al. 1979 |  |
| < | Mixed Grass - Scrub Series, Mixed Grass-*Prosopis juliflora* Association - 143.152 | Brown et al. 1979 |  |
| < | Mixed Shrub Series, *Poliomintha incana - Rhus trilobata / Eriogonum annuum - Abronia angustifolia* type | Dick-Peddie 1993 |  |
| < | Mixed Shrub Series, *Prosopis glandulosa / Gutierrezia sarothrae* Sparse Mixed Grass-Forbs (dunes) type | Dick-Peddie 1993 |  |
| < | Sacaton - Scrub Series - 143.14 | Brown et al. 1979 |  |
| < | Sacaton - Scrub Series, *Sporobolus wrightii-Prosopis juliflora* Association - 143.142 | Brown et al. 1979 |  |
| < | Shrub - Scrub Disclimax Series - 143.16 | Brown et al. 1979 |  |
| < | Shrub - Scrub Series, *Gutierrezia sarothrae-Prosopis juliflora* Association - 143.165 | Brown et al. 1979 |  |
| < | Shrub - Scrub Series, *Haplopappus tenuisectus-Prosopis juliflora* Association - 143.163 | Brown et al. 1979 |  |
| ? | Sideoats Grama - Sumac - Juniper (735) | Shiflet 1994 |  |
| < | Tobosa Grass - Scrub Series - 143.12 | Brown et al. 1979 |  |
| < | Tobosa Grass - Scrub Series, *Hilaria mutica-Prosopis juliflora* Association - 143.122 | Brown et al. 1979 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D.E. Brown, C.H. Lowe, and C.P. Pase (1979)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and E.H. Muldavin

Acknowledgments [optional]:

Version Date: 05 Nov 2015

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3. Desert & Semi-Desert

3.A.2.Na. North American Warm Desert Scrub & Grassland

M087. Chihuahuan Semi-Desert Grassland

Type Concept Sentence: This warm-temperate to subtropical, semi-desert scrub macrogroup occurs in the southwestern U.S. and adjacent Sonora and central to northern Baja California, Mexico, and is characterized by a sparse to moderately dense layer (1-50% cover) of xeromorphic, evergreen and drought-deciduous, microphyllous and broad-leaved shrubs and/or succulent species, especially cacti and rosette stem succulents and sarcocaulescent trees and shrubs. *Larrea tridentata* is often present to dominant with *Ambrosia dumosa* and many Sonoran or Mojave desert diagnostic species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Na. North American Warm Desert Scrub & Grassland (D039)

Elcode: M087

\*Scientific Name: *Bouteloua eriopoda - Muhlenbergia emersleyi - Pleuraphis mutica* Chihuahuan Semi-Desert Grassland Macrogroup

\*Common (Translated Scientific) Name: Black Grama - Bullgrass - Tobosa Grass Chihuahuan Semi-Desert Grassland Macrogroup

\*Colloquial Name: Chihuahuan Semi-Desert Grassland

\*Type Concept: This warm-temperate to subtropical, semi-desert macrogroup occurs in the southwestern U.S. and adjacent Sonora and central to northern Baja California, Mexico. The vegetation is diverse and is characterized by a sparse to moderately dense layer (1-50% cover) of xeromorphic, evergreen and drought-deciduous, microphyllous and broad-leaved shrubs and/or succulent species, especially cacti and rosette stem succulents and sarcocaulescent trees and shrubs. *Larrea tridentata* is often present to dominant with *Ambrosia dumosa* in much of the vegetation of this macrogroup, especially the drier interfluves and lower bajadas with the larger woody cacti and microphylls limited to desert areas of more effective precipitation from runoff (washes or shallow braided channels across alluvial fans) and in areas with coarser-textured soil such as upper bajadas. *Ambrosia dumosa, Encelia farinosa*, and *Ephedra aspera* are diagnostic in the Mojave Desert. The Arizona Upland portion of the Sonoran Desert is characterized by *Carnegiea gigantea* with shrub layers dominated by *Parkinsonia microphylla* or *Larrea tridentata*. *Fouquieria splendens, Olneya tesota*, and many cacti species are often present. The subtropical central Gulf of California coast and adjacent portions of the lower Colorado River valley region are characterized by *Bursera microphylla, Jatropha cuneata, Pachycereus* spp., and *Stenocereus thurberi*. In coastal Baja and adjacent southern California, *Agave shawii, Bergerocactus emoryi, Euphorbia misera, Ferocactus viridescens, Lycium californicum, Cylindropuntia californica var. parkeri, Opuntia littoralis, Cylindropuntia prolifera*, and *Yucca schidigera* are diagnostic and often dominant species. In addition, this macrogroup includes areas of sparsely to moderately vegetated warm semi-desert dunes, sandsheets, and sandy plains characterized by *Abronia villosa, Croton wigginsii, Dicoria canescens, Eriogonum deserticola, Helianthus niveus, Oenothera deltoides, Palafoxia* spp., and *Panicum urvilleanum* often with *Achnatherum hymenoides, Achnatherum speciosum*, and *Pleuraphis rigida*. Numerous other species may be present in this diverse macrogroup. In the Arizona Upland of the Sonoran Desert, stands occur on the lower slopes of mountains, foothills, hillsides, mesas, and upper bajadas. Stands form the vegetation matrix in broad valleys, lower bajadas, plains and low hills in the Mojave, Sonoran and Lower Colorado deserts. Stands also occur in coastal plains found on both sides of the Gulf of California and along the central Baja California coast, with a depauperate extension north along immediate coastal bluffs and xeric slopes intermittently to southern California, including the more southerly Channel Islands (San Clemente, Catalina, Santa Barbara, and Anacapa). Elevation ranges from -75 to 1200 m. Climate is semi-arid to arid and season of precipitation varies regionally. The annual precipitation in the Sonoran Desert has a bimodal distribution with about half of the rain falling during July to September and a third falling from December to March. Farther west, the proportion of summer precipitation decreases until precipitation has a markedly unimodal distribution with most precipitation falling in the winter months associated with winter storm tracks reaching the desert from the Pacific Ocean in the Mojave Desert. In contrast, in central Baja California, climate is extremely arid with mean annual precipitation of less than 100 mm, which occurs mostly in the summer-early fall season (monsoon). Precipitation is augmented by summer fog drip near the coast. Inland Sonoran stands are also extremely arid with mean annual precipitation of less than 100 mm, which occurs mostly in the summer-early fall season (monsoon). Extended drought is common which favors plants with water storage. Substrates are variable, but typically shallow, well-drained, rocky or gravelly coarse-textured soils derived from colluvium or alluvium, except for the sand deposit sites included in the macrogroup. Parent material is usually gravelly alluvium and colluvium, derived from basalt and other igneous or metamorphic rocks.

\*Diagnostic Characteristics: This matrix warm to subtropical, semi-desert macrogroup is characterized by a sparse to moderately dense layer (1-50% cover) of xeromorphic, evergreen and drought-deciduous, microphyllous and broad-leaved shrubs and/or succulent species, especially cacti and stem succulents. Widespread diagnostic species *Larrea tridentata* differentiates this macrogroup from cool desert scrub. It is separated from the Chihuahuan Desert macrogroup by the lack of characteristic Chihuahuan species such as *Flourensia cernua*, and the presence of Sonoran Desert and Baja Norte species of *Bursera, Carnegiea, Jatropha, Olneya, Pachycereus, Parkinsonia, Simmondsia*, and *Stenocereus* or Mojave species such as *Ambrosia dumosa, Encelia farinosa*, or *Ephedra aspera*. In addition, this macrogroup includes areas of sparsely to moderately vegetated warm semi-desert dunes, sandsheets, and sandy plains characterized by *Abronia villosa, Croton wigginsii, Dicoria canescens, Eriogonum deserticola, Helianthus niveus, Panicum urvilleanum, Pleuraphis rigida*, and many other native forbs. It also includes sparsely vegetated desert pavements and rock outcrops with variable cover of plants, including *Atriplex hymenelytra, Peucephyllum schottii, Camissonia* spp., *Chorizanthe* spp., and *Geraea canescens*.

\*Classification Comments: ~Sonoran Sarcocaulescent Desert Scrub Group (G292)$$ is restricted to northwestern Mexico and doe not occur in the United States. However, limited components of the group occur as disjunct populations of *Bursera microphylla, Jatropha cuneata, Pachycereus schottii*, and *Stenocereus thurberi* occurring north across the border into southwestern Arizona and forming special stands within ~Sonoran Paloverde - Mixed Cacti Desert Scrub Group (G293)$$. These special stands are known from the Santa Rosa and Ajo mountains at Organ Pipe Cactus National Monument, Copper Mountains, southern Gila Mountains and northern Tinajas Altas Mountains of the Barry M. Goldwater Range, and the Growler Mountains in the Cabeza Prieta National Wildlife Refuge and need to be better understood.

Another issue with disjunct populations includes *Simmondsia chinensis*. In California stands of this species occur as desert margin rather than true desert scrub. They occur surrounded by drier inland versions of ~Californian Coastal Scrub Macrogroup (M044)$$, but have some cacti species and some other Sonoran Desert species too. *Simmondsia chinensis* is an indicator of the greater Sonoran Desert but it also resprouts after fire and, in the relatively rare cases where it exists as a dominant, it may be because many other desert species don't resprout after fire and may have been eliminated. Now we put this alliance into ~Sonoran Paloverde - Mixed Cacti Desert Scrub Group (G293)$$, but about half of the known stands are actually more closely related to ~Central & Southern Californian Coastal Sage Scrub Group (G264)$$ in the ~Californian Coastal Scrub Macrogroup (M044)$$.

Another outlier example is the stands of *Viguiera laciniata (= Bahiopsis laciniata)* in southwestern California. The species is diagnostic of this macrogroup and ~Baja Semi-Desert Coastal Succulent Scrub Group (G298)$$ according to Brown (1982a) (ragged-leaf goldeneye-boojum series), but in southern California stands are always associated with coastal scrub. These special stands have high cover and constancy of *Viguiera laciniata* and have few other desert species in them, mostly because they tend to burn frequently in southern California. They may be related to G298, but also to ~Californian Coastal Scrub Macrogroup (M044)$$ and ~Central & Southern Californian Coastal Sage Scrub Group (G264)$$, within which they are currently placed.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M053 | Western Great Plains Shortgrass Prairie | transitions into this macrogroup (M087) in the southern Great Plains and shares a few widespread dominant species such as *Bouteloua gracilis, Bouteloua curtipendula*, and *Eragrostis intermedia*. |
| M086 | Chihuahuan Desert Scrub | may have similar species compositions, but is dominated by shrubs with the herbaceous layer typically less abundant. Degraded stands often have scattered desert scrub such as *Larrea tridentata, Flourensia cernua*, and *Prosopis glandulosa* present. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is characterized by a sparse to dense herbaceous layer dominated by perennial desert grasses. Forbs are usually present but have low cover. There is often a rich assortment of scattered xeromorphic evergreen and deciduous shrubs, rosette stem succulents, and cacti. Shrubs and succulents usually have lower total cover than the herbaceous layer, except for gypsiferous vegetation which may be dominated by dwarf-shrubs and shrublands forming shrub-steppes and shrublands. The presence of gypsophilous species is a more important indicator than vegetation structure.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This matrix warm temperate to subtropical semi-desert macrogroup is characterized by a sparse to moderately dense layer (1-50% cover) of xeromorphic, evergreen and drought-deciduous, microphyllous and broad-leaved shrubs and/or succulent species, especially cacti and rosette stem succulents and sarcocaulescent trees and shrubs. *Larrea tridentata* is often present to dominant in much of the vegetation of this macrogroup, especially the drier interfluves and lower bajadas with the larger woody cacti and microphylls limited to desert areas of more effective precipitation from runoff (washes or shallow braided channels across alluvial fans) and in areas with coarser-textured soil such as upper bajadas. *Ambrosia dumosa, Encelia farinosa*, and *Ephedra aspera (= Ephedra fasciculata)*, are diagnostic in the Mojave Desert. The Arizona Upland portion of the Sonoran Desert is characterized by *Carnegiea gigantea* (3-16 m tall) with sparse to moderately dense, xeromorphic, deciduous and evergreen shrub layers dominated by *Parkinsonia microphylla* or *Larrea tridentata*. Often *Fouquieria splendens* and *Olneya tesota* are present, although usually less prominently. There are typically many cacti present, including species of *Coryphantha, Echinocereus, Ferocactus, Mammillaria*, and *Opuntia* (both cholla and prickly-pear). The subtropical central Gulf of California coast and adjacent portions of the lower Colorado River valley region of the Sonoran Desert are characterized by *Bursera microphylla, Jatropha cuneata, Pachycereus schottii, Pachycereus pringlei, Pachycereus pecten-aboriginum*, and *Stenocereus thurberi*, and in Baja Norte, *Agave shawii, Bergerocactus emoryi, Euphorbia misera, Ferocactus viridescens, Lycium californicum, Cylindropuntia californica var. parkeri (= Opuntia parryi), Opuntia littoralis, Cylindropuntia prolifera (= Opuntia prolifera)*, and *Yucca schidigera* are diagnostic and often dominant species. In addition, this macrogroup includes areas of sparsely to moderately vegetated warm semi-desert dunes, sandsheets, and sandy plains characterized by *Abronia villosa, Croton wigginsii, Dicoria canescens, Eriogonum deserticola, Helianthus niveus, Panicum urvilleanum, Petalonyx thurberi*, and *Penstemon thurberi* often with *Achnatherum hymenoides, Achnatherum speciosum, Muhlenbergia porteri*, and *Pleuraphis rigida*. It also includes sparsely vegetated desert pavements and rock outcrops with variable cover of plants including *Atriplex hymenelytra, Peucephyllum schottii, Camissonia* spp., *Chorizanthe* spp., and *Geraea canescens*. Numerous other species may be present in the diverse macrogroup. Floristic information was compiled from Shreve and Wiggins (1964), Felger (1980), Bowers (1982, 1984), Brown (1982a), Turner and Brown (1982), Barbour and Major (1988), MacMahon (1988), Peinado et al. (1994), Holland and Keil (1995), Sawyer and Keeler-Wolf (1995), and Sawyer et al. (2009).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: During the last century, the area occupied by this desert grassland and steppe decreased through conversion of desert grasslands as a result of drought, overgrazing and *Prosopis glandulosa* seed dispersion by livestock, and/or decreases in fire frequency (Buffington and Herbel 1965, Brown and Archer 1987). It is believed that mesquite formerly occurred in relatively minor amounts and was largely confined to drainages until cattle distributed seed upland into desert grasslands (Brown and Archer 1987, 1989). Shrublands dominated by *Prosopis* spp. have replaced large areas of desert grasslands, especially those formerly dominated by *Bouteloua eriopoda*, in Trans-Pecos Texas, southern New Mexico and southeastern Arizona (York and Dick-Peddie 1969, Hennessy et al. 1983). Studies on the Jornada Experimental Range suggest that combinations of drought, overgrazing by livestock, wind and water erosion, seed dispersal by livestock, fire suppression, shifting dunes, and changes in the seasonal distribution of precipitation have caused this recent, dramatic shift in vegetation physiognomy (Buffington and Herbel 1965, Herbel et al. 1972, Humphrey 1974, McLaughlin and Bowers 1982, Gibbens et al. 1983, Hennessy et al. 1983, Schlesinger et al. 1990, McPherson 1995).

Impermeable caliche and argillic horizons are common on these sites. These layers restrict deep percolation of soil water and may favor the shallower rooted grasses over more deeply rooted shrubs such as *Larrea tridentata* and *Prosopis* spp. (McAuliffe 1995). *Pleuraphis mutica* is relatively tolerant of livestock grazing. In west-central Arizona, livestock have nearly eliminated all native grasses except *Pleuraphis mutica* from semi-desert grassland (Brown 1982a). Stands codominated by *Scleropogon brevifolius* are characteristic of sites with past heavy grazing by livestock (Whitfield and Anderson 1938).

In gypsophilous grassland *Sporobolus nealleyi* is dominant with *Tiquilia hispidissima* and *Opuntia polyacantha* on crusted gypsum ridges, but not on unstable gypsum dunes (Burgess and Northington 1977). The eolian processes and sand substrate on gypsum dunes may be as important ecologically as the chemical properties of the gypsum parent material as seen by presence of sand-loving plant species such as *Achnatherum hymenoides, Andropogon hallii, Artemisia filifolia, Muhlenbergia pungens*, and *Psorothamnus scoparius* on gypsum dunes.

ENVIRONMENT

Environmental Description: This warm-temperate to subtropical, semi-desert macrogroup occurs in the southwestern U.S. and adjacent Sonora and Baja California, Mexico. It forms the vegetation matrix in broad valleys, lower bajadas, plains and low hills in the Mojave, western Sonoran and Lower Colorado deserts. Elevation ranges from -75 to 1200 m. Sites are gentle to moderately sloping. Substrates are typically well-drained, sandy soils derived from colluvium or alluvium, and are often calcareous with a caliche hardpan and/or a pavement surface. Precipitation is markedly unimodal with most falling in the winter months associated with winter storm tracks reaching the desert from the Pacific Ocean. Stands extend north into the broad transition with the Great Basin and at higher elevations on desert mountains above *Larrea tridentata - Ambrosia dumosa* desert scrub and below the lower montane woodlands (700-1800 m elevation) that occurs in the eastern and central Mojave Desert. Stands in the Arizona Sonoran Desert occur on lower slopes of mountains, foothills, hillsides, mesas, upper bajadas, and less commonly in valleys and plains in southern Arizona and extreme southeastern California. Elevations range from 150-1070 m (Shreve and Wiggins 1964). Climate is semi-arid. Summers are hot and winters rarely have freezing temperatures. Freezing winter temperatures limit the elevational and northern extent of these stands. Annual precipitation has bimodal distribution with about half of the rain falling during July to September and a third falling from December to March. Farther west, the proportion of summer precipitation decreases until there is not enough summer moisture to sustain *Carnegiea gigantea* (Barbour and Major 1977). Stands in the subtropical central Gulf of California coast and adjacent portions of the lower Colorado River valley region of the Sonoran Desert occur on gentle to steep, rocky sites. It extends north into the extreme southwestern U.S. and northern Sonora.

Sites in northern Baja and southern California occur on isolated maritime coastal bluffs and terraces. Sites in the Vizcaino Region of central Baja California reach several kilometers inland. These areas are frost-free and receive the least annual precipitation of the California and Baja California coastal shrublands, most of which falls in winter. Climate is extremely arid with mean annual precipitation of less than 100 mm, which occurs mostly in the summer-early fall season (monsoon). Precipitation is augmented by summer fog drip. Sonoran stands are extremely arid with mean annual precipitation of less than 100 mm, which occurs mostly in the summer-early fall season (monsoon). Extended drought is common which favors plants with water storage (Turner and Brown 1982). Semi-desert vegetated and sparsely vegetated sandsheets and dunes that are stabilized or partially stabilized are included in this macrogroup. They occur as small to large patches or as a complex of active and stabilized dunes. These sand deposits often form on the leesides of desert playas and basins that serve as a source for the sand. Substrates are variable, but typically shallow, well-drained, rocky or gravelly, coarse-textured soils derived from colluvium or alluvium, except for the sand deposit vegetation included in the macrogroup, which is eolian. Parent material is usually gravelly alluvium and colluvium, derived from basalt and other igneous or metamorphic rocks.

DISTRIBUTION

\*Geographic Range: This grassland macrogroup is found from the northern to central Chihuahuan Desert and extends into Trans-Pecos Texas, north into the southwestern Great Plains and west to the Sonoran Desert with scattered occurrences northward to the Mogollon Rim in central Arizona. Stands are described from Jornada del Muerto Basin, Marfa grasslands and Marathon Basin, south to central Chihuahua and Coahuila, Mexico.

Nations: MX, US

States/Provinces: AZ, MXCH, MXCO, MXSO, NM, TX

USFS Ecoregions (2007) [optional]: 313B:CC, 313C:CC, 315A:CC, 315B:CC, 315H:CC, 321A:CC, 322A:CC, 322B:CC, M313A:CC, M313B:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G490 | Chihuahuan Desert Foothill-Piedmont & Lower Montane Grassland |
| G492 | Chihuahuan Gypsophilous Grassland |
| G491 | Chihuahuan Sandy Plains Semi-Desert Grassland |
| G489 | Chihuahuan Semi-Desert Lowland Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | *Bouteloua eriopoda/Ephedra torreyana* PA | Muldavin et al. 2000b |  |
| < | *Bouteloua eriopoda/Yucca elata* PA | Muldavin et al. 2000b |  |
| < | *Pleuraphis mutica - Sporobolus airoides* Herbaceous Vegetation | NHNM unpubl. data |  |
| < | *Scleropogon brevifolius* / Monotypic Herbaceous Vegetation | NHNM unpubl. data |  |
| < | *Sporobolus nealleyi/Ephedra torreyana* PA | Muldavin et al. 2000b |  |
| < | *Sporobolus nealleyi/Sporobolus airoides* PA | Muldavin et al. 2000b |  |
| < | *Sporobolus nealleyi/Tiquilia hispidissima* PA | Muldavin et al. 2000b |  |
| > | Alkali Sacaton - Tobosagrass (701) | Shiflet 1994 |  |
| > | Apacherian mixed shrub savanna | Burgess 1995 |  |
| >< | Black Grama - Sideoats Grama (703) | Shiflet 1994 |  |
| >< | Blue Grama - Sideoats Grama (706) | Shiflet 1994 |  |
| >< | Blue Grama - Sideoats Grama - Black Grama (707) | Shiflet 1994 |  |
| < | Curleymesquite Grass - Scrub Series - 143.13 | Brown et al. 1979 |  |
| < | Curleymesquite Grass - Scrub Series, *Hilaria belangeri*-Mixed Shrub Association - 143.131 | Brown et al. 1979 |  |
| < | Grama - Tobosa Shrub (505) | Shiflet 1994 |  |
| >< | Grama -Muhly - Threeawn (713) | Shiflet 1994 |  |
| < | Grama Grass - Scrub Series - 143.11 | Brown et al. 1979 |  |
| < | Grama Grass - Scrub Series, *Bouteloua eriopoda-Yucca elata* Association - 143.111 | Brown et al. 1979 |  |
| < | Grama Grass - Scrub Series, *Bouteloua eriopoda*-Mixed Grass Association - 143.113 | Brown et al. 1979 |  |
| < | Grama Grass - Scrub Series, *Bouteloua* spp.-Mixed Grass Association - 143.114 | Brown et al. 1979 |  |
| = | Gypsophilous Scrub | Henrickson et al. 1985 |  |
| > | MLRA 42 - Southern Desertic Basin (SD-1) Gyp Uplands | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-1) Loamy | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-1) R042XA058NM Hills | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-1) R042XA059NM Limestone Hills | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-2) Gyp Uplands | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-2) Limy | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-2) Loamy | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-2) R042XB021NM Limestone Hills | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-2) R042XB027NM Hills | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-3) Gyp Uplands | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-3) Loamy | NRCS 2006a |  |
| > | MLRA 42 - Southern Desertic Basin (SD-4) Limy and Shallow Sandy | NRCS 2006a |  |
| >< | Oak - Juniper Woodland and Mahogany - Oak (509) | Shiflet 1994 |  |
| >< | Sideoats Grama - Sumac - Juniper (735) | Shiflet 1994 |  |
| < | Tobosa Grass - Scrub Series - 143.12 | Brown et al. 1979 |  |
| < | Tobosa Grass - Scrub Series, *Hilaria mutica* Association - 143.121 | Brown et al. 1979 |  |
| < | Tobosa Grass - Scrub Series, *Hilaria mutica*-Mixed Shrub Association - 143.123 | Brown et al. 1979 |  |
| >< | Western Live Oak: 241 | Eyre 1980 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D.E. Brown, C.H. Lowe, and C.P. Pase (1979)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and E.H. Muldavin

Acknowledgments [optional]:

Version Date: 16 Apr 2015

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3. Desert & Semi-Desert

3.A.2.Na. North American Warm Desert Scrub & Grassland

M088. Mojave-Sonoran Semi-Desert Scrub

Type Concept Sentence: This warm temperate to subtropical, semi-desert scrub macrogroup occurs in the southwestern U.S. and adjacent Sonora and central to northern Baja California, Mexico, and is characterized by a sparse to moderately dense layer (1-50% cover) of xeromorphic, evergreen and drought-deciduous, microphyllous and broad-leaved shrubs and/or succulent species, especially cacti and rosette stem succulents and sarcocaulescent trees and shrubs. *Larrea tridentata* is often present to dominant with *Ambrosia dumosa* and many Sonoran or Mojave desert diagnostic species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Na. North American Warm Desert Scrub & Grassland (D039)

Elcode: M088

\*Scientific Name: *Carnegiea gigantea - Stenocereus thurberi - Ambrosia dumosa* Mojave-Sonoran Semi-Desert Scrub Macrogroup

\*Common (Translated Scientific) Name: Saguaro - Organ Pipe Cactus - Burrobush Mojave-Sonoran Semi-Desert Scrub Macrogroup

\*Colloquial Name: Mojave-Sonoran Semi-Desert Scrub

\*Type Concept: This broad macrogroup encompasses warm temperate to subtropical semi-desert climates of the southwestern U.S. and adjacent Sonora and central to northern Baja California, Mexico. The vegetation is diverse and is characterized by a sparse to moderately dense layer (1-50% cover) of xeromorphic, evergreen or drought-deciduous, microphyllous or broad-leaved shrubs and/or succulent species, especially cacti, rosette stem succulents such as agaves, and sarcocaulescent trees and shrubs. *Larrea tridentata* is often present to dominant with *Ambrosia dumosa* throughout much of the range of this macrogroup, and occurs on finer-textured mid to lower bajadas. On upper bajadas with coarser soils, where more moisture is available, these shrubs are mixed with increasing higher diversity of cacti and other shrubs. In areas of limited moisture, the mixed shrubs can be seen following washes or shallow braided channels across alluvial fans. Species composition changes across this vast desert area. *Ambrosia dumosa, Ephedra aspera, Eriogonum fasciculatum, Yucca brevifolia*, or *Yucca schidigera* are diagnostic in the northern most portion known as the Mojave Desert. The Arizona Upland portion of the Sonoran Desert is characterized by *Carnegiea gigantea* with shrub layers dominated by *Parkinsonia microphylla* or *Larrea tridentata*. *Fouquieria splendens, Olneya tesota*, and many cacti species are often present. The subtropical central Gulf of California coast and adjacent portions of the lower Colorado River valley region are characterized by *Bursera microphylla, Jatropha cuneata, Pachycereus* spp., and *Stenocereus thurberi*. In coastal Baja and adjacent southern California, *Agave shawii, Bergerocactus emoryi, Euphorbia misera, Ferocactus viridescens, Lycium californicum, Cylindropuntia californica var. parkeri, Opuntia littoralis, Cylindropuntia prolifera*, and *Yucca schidigera* are diagnostic and often dominant species.

In addition, this macrogroup includes areas of sparsely to moderately vegetated warm semi-desert dunes, sandsheets, and sandy plains characterized by *Abronia villosa, Croton wigginsii, Dicoria canescens, Eriogonum deserticola, Helianthus niveus, Oenothera deltoides, Palafoxia* spp., and *Panicum urvilleanum* often with *Achnatherum hymenoides, Achnatherum speciosum*, and *Pleuraphis rigida*. Numerous other species may be present in this diverse macrogroup. In the Arizona Upland of the Sonoran Desert, stands occur on the lower slopes of mountains, foothills, hillsides, mesas, and upper bajadas. Stands form the vegetation matrix in broad valleys, lower bajadas, plains and low hills in the Mojave, Sonoran and Lower Colorado deserts. Stands also occur in coastal plains found on both sides of the Gulf of California and along the central Baja California coast, with a depauperate extension north along immediate coastal bluffs and xeric slopes intermittently to southern California, including the more southerly Channel Islands (San Clemente, Catalina, Santa Barbara, and Anacapa). Elevation ranges from -75 to 1800 m. Climate is semi-arid to arid and season of precipitation varies regionally. The annual precipitation in the Sonoran Desert has a bimodal distribution with about half of the rain falling during July to September and a third falling from December to March. Farther west, the proportion of summer precipitation decreases until precipitation has a markedly unimodal distribution with most precipitation falling in the winter months associated with winter storm tracks reaching the desert from the Pacific Ocean in the Mojave Desert. In contrast, in central Baja California, climate is extremely arid with mean annual precipitation of less than 100 mm, which occurs mostly in the summer-early fall season (monsoon). Precipitation is augmented by summer fog drip near the coast. Inland Sonoran stands are also extremely arid with mean annual precipitation of less than 100 mm, which occurs mostly in the summer-early fall season (monsoon). Extended drought is common which favors plants with water storage. Substrates are variable, but typically shallow, well-drained, rocky or gravelly coarse-textured soils derived from colluvium or alluvium, except for the sand deposit sites included in the macrogroup. Parent material is usually gravelly alluvium and colluvium, derived from basalt and other igneous or metamorphic rocks.

\*Diagnostic Characteristics: This matrix warm to subtropical, semi-desert macrogroup is characterized by a sparse to moderately dense layer (1-50% cover) of xeromorphic, evergreen and drought-deciduous, microphyllous and broad-leaved shrubs and/or succulent species, especially cacti and stem succulents. Widespread diagnostic species *Larrea tridentata* differentiates this macrogroup from cool desertscrub. It is separated from the Chihuahuan Desert macrogroup by the lack of characteristic Chihuahuan species such as *Flourensia cernua*, and the presence of Sonoran Desert and Baja Norte species of *Bursera, Carnegiea, Jatropha, Olneya, Pachycereus, Parkinsonia, Simmondsia*, and *Stenocereus* or Mojave species such as *Ambrosia dumosa, Ephedra aspera, Eriogonum fasciculatum, Yucca brevifolia*, or *Yucca schidigera*. In addition, this macrogroup includes areas of sparsely to moderately vegetated warm semi-desert dunes, sandsheets, and sandy plains characterized by *Abronia villosa, Croton wigginsii, Dicoria canescens, Eriogonum deserticola, Helianthus niveus, Panicum urvilleanum, Pleuraphis rigida*, and many other native forbs. It also includes sparsely vegetated desert pavements and rock outcrops with variable cover of plants, including *Atriplex hymenelytra, Peucephyllum schottii, Camissonia* spp., *Chorizanthe* spp., and *Geraea canescens*.

\*Classification Comments: This macrogroup includes ~Mojave-Sonoran Bajada & Valley Desert Scrub Group (G295)$$. The associations in this group need review as some are more appropriate in a cool temperate macrogroup. In fact, ~Mojave Mid-Elevation Mixed Desert Scrub Group (G296)$$ may not be a great fit in this macrogroup, as alliances in G296 are found in cooler/higher elevations, similar to other alliances found in ~Great Basin-Intermountain Dry Shrubland & Grassland Macrogroup (M171)$$. Perhaps a "transitional" mid-elevation scrub grouping is needed, occurring at higher elevations and crossing from Sonoran to Mojave and Great Basin, and which can include *Coleogyne ramosissima, Ephedra viridis, Ephedra nevadensis, Ephedra torreyana, Purshia stansburiana*, etc. As currently defined G296 is significantly rich with taxa not described in this macrogroup description and highly related to ~Colorado Plateau Blackbrush - Mormon-tea Shrubland Group (G312)$$.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M086 | Chihuahuan Desert Scrub | may also be dominated by *Larrea tridentata* and *Prosopis* spp., but there are typically Chihuahuan Desert indicator species such as *Flourensia cernua* present. |
| M089 | Viscaino-Baja California Desert Scrub |  |
| M117 | North American Warm Semi-Desert Cliff, Scree & Rock Vegetation |  |
| M171 | Great Basin-Intermountain Dry Shrubland & Grassland |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is characterized by a sparse to moderately dense layer (1-50% cover) of xeromorphic, evergreen and drought-deciduous, microphyllous, and broad-leaved shrubs and/or succulent and semi-succulent species, especially cacti and rosette stem succulents and sarcocaulescent trees and shrubs. Sonoran stands are dominated by columnar cacti with xeromorphic tree and shrub layers. Baja Norte stands are often dominated by semi-succulent sarcocaulescent trees and shrubs with swollen stems. The sandsheet stands are characterized by sparse shrubs or herbaceous species.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This matrix warm temperate to subtropical semi-desert macrogroup is characterized by a sparse to moderately dense layer (1-50% cover) of xeromorphic, evergreen and drought-deciduous, microphyllous and broad-leaved shrubs and/or succulent species, especially cacti and rosette stem succulents and sarcocaulescent trees and shrubs. *Larrea tridentata* is often present to dominant in much of the vegetation of this macrogroup, especially the drier interfluves and lower bajadas with the larger woody cacti and microphylls limited to desert areas of more effective precipitation from runoff (washes or shallow braided channels across alluvial fans) and in areas with coarser-textured soil such as upper bajadas. *Ambrosia dumosa, Ephedra aspera (= Ephedra fasciculata), Eriogonum fasciculatum, Yucca brevifolia*, or *Yucca schidigera* are diagnostic in the Mojave Desert. The Arizona Upland portion of the Sonoran Desert is characterized by *Carnegiea gigantea* (3-16 m tall) with sparse to moderately dense, xeromorphic, deciduous and evergreen shrub layers dominated by *Parkinsonia microphylla* or *Larrea tridentata*. Often *Fouquieria splendens* and *Olneya tesota* are present, although usually less prominently. There are typically many cacti present, including species of *Coryphantha, Echinocereus, Ferocactus, Mammillaria*, and *Opuntia* (both cholla and prickly-pear). The subtropical central Gulf of California coast and adjacent portions of the lower Colorado River valley region of the Sonoran Desert are characterized by *Bursera microphylla, Jatropha cuneata, Pachycereus schottii, Pachycereus pringlei, Pachycereus pecten-aboriginum*, and *Stenocereus thurberi*, and in Baja Norte, *Agave shawii, Bergerocactus emoryi, Euphorbia misera, Ferocactus viridescens, Lycium californicum, Cylindropuntia californica var. parkeri (= Opuntia parryi), Opuntia littoralis, Cylindropuntia prolifera (= Opuntia prolifera)*, and *Yucca schidigera* are diagnostic and often dominant species. In addition, this macrogroup includes areas of sparsely to moderately vegetated warm semi-desert dunes, sandsheets, and sandy plains characterized by *Abronia villosa, Croton wigginsii, Dicoria canescens, Eriogonum deserticola, Helianthus niveus, Panicum urvilleanum, Petalonyx thurberi*, and *Penstemon thurberi* often with *Achnatherum hymenoides, Achnatherum speciosum, Muhlenbergia porteri*, and *Pleuraphis rigida*. It also includes sparsely vegetated desert pavements and rock outcrops with variable cover of plants including *Atriplex hymenelytra, Peucephyllum schottii, Camissonia* spp., *Chorizanthe* spp., and *Geraea canescens*. Numerous other species may be present in the diverse macrogroup. Floristic information was compiled from Shreve and Wiggins (1964), Felger (1980), Bowers (1982, 1984), Brown (1982a), Turner and Brown (1982), Barbour and Major (1988), MacMahon (1988), Peinado et al. (1994), Holland and Keil (1995), Sawyer and Keeler-Wolf (1995), and Sawyer et al. (2009).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: This macrogroup occurs in warm to subtropical semi-arid regions. Most characteristic species are frost-sensitive as only vegetation in the Mojave Desert or at high elevation or in the northern extent of the Sonoran Desert experience frost or extended freezing temperatures.

ENVIRONMENT

Environmental Description: This warm-temperate to subtropical, semi-desert macrogroup occurs in the southwestern U.S. and adjacent Sonora and Baja California, Mexico. It forms the vegetation matrix in broad valleys, lower bajadas, plains and low hills in the Mojave, western Sonoran and Lower Colorado deserts. Elevation ranges from -75 to 1200 m. Sites are gentle to moderately sloping. Substrates are typically well-drained, sandy soils derived from colluvium or alluvium, and are often calcareous with a caliche hardpan and/or a pavement surface. Precipitation is markedly unimodal with most falling in the winter months associated with winter storm tracks reaching the desert from the Pacific Ocean. Stands extend north into the broad transition with the Great Basin and at higher elevations on desert mountains above *Larrea tridentata - Ambrosia dumosa* desertscrub and below the lower montane woodlands (700-1800 m elevation) that occurs in the eastern and central Mojave Desert. Stands in the Arizona Sonoran Desert occur on lower slopes of mountains, foothills, hillsides, mesas, upper bajadas, and less commonly in valleys and plains in southern Arizona and extreme southeastern California. Elevations range from 150-1070 m (Shreve and Wiggins 1964). Climate is semi-arid. Summers are hot and winters rarely have freezing temperatures. Freezing winter temperatures limit the elevational and northern extent of these stands. Annual precipitation has bimodal distribution with about half of the rain falling during July to September and a third falling from December to March. Farther west, the proportion of summer precipitation decreases until there is not enough summer moisture to sustain *Carnegiea gigantea* (Barbour and Major 1977). Stands in the subtropical central Gulf of California coast and adjacent portions of the lower Colorado River valley region of the Sonoran Desert occur on gentle to steep, rocky sites. It extends north into the extreme southwestern U.S. and northern Sonora.

At Organ Pipe National Monument, stands typically occur on southerly aspects between 550 and 765 m (1800-2500 feet) elevation. In general, sites have gentle to steep slopes. Sites in northern Baja and southern California occur on isolated maritime coastal bluffs and terraces. Sites in the Vizcaino Region of central Baja California reach several kilometers inland. These areas are frost-free and receive the least annual precipitation of the California and Baja California coastal shrublands, most of which falls in winter. Climate is extremely arid with mean annual precipitation of less than 100 mm, which occurs mostly in the summer-early fall season (monsoon). Precipitation is augmented by summer fog drip. Sonoran stands are extremely arid with mean annual precipitation of less than 100 mm, which occurs mostly in the summer-early fall season (monsoon). Extended drought is common which favors plants with water storage (Turner and Brown 1982). Semi-desert vegetated and sparsely vegetated sandsheets and dunes that are stabilized or partially stabilized are included in this macrogroup. They occur as small to large patches or as a complex of active and stabilized dunes. These sand deposits often form on the leesides of desert playas and basins that serve as a source for the sand. Substrates are variable, but typically shallow, well-drained, rocky or gravelly, coarse-textured soils derived from colluvium or alluvium, except for the sand deposit vegetation included in the macrogroup, which is eolian. Parent material is usually gravelly alluvium and colluvium, derived from basalt and other igneous or metamorphic rocks.

DISTRIBUTION

\*Geographic Range: This macrogroup forms the matrix of the vegetation in the Sonoran, Colorado and Mojave deserts of the southwestern U.S. and adjacent Mexico.

Nations: MX, US

States/Provinces: AZ, CA, MXBC, MXSO, NV, UT

USFS Ecoregions (2007) [optional]: 313A:CC, 313C:CC, 321A:CC, 322A:CC, 322B:CC, 322C:CC, 341D:CP, 341E:C?, 341F:CC, 342B:PP, M261E:CC, M341A:CC, M341D:C?

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: This macrogroup needs clarification in regards to vegetation in Baja California, Mexico.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G298 | Baja Semi-Desert Coastal Succulent Scrub |
| G295 | Mojave-Sonoran Bajada & Valley Desert Scrub |
| G293 | Sonoran Paloverde - Mixed Cacti Desert Scrub |
| G292 | Sonoran Sarcocaulescent Desert Scrub |
| G675 | North American Warm Semi-Desert Dune & Sand Flats |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | \*154.1261 *Cercidium microphyllum - Encelia farinosa - Lemaireocereus thurberi - Jatropha cuneata* Association | Warren et al. 1981 |  |
| < | \*154.1271 *Cercidium microphyllum - Encelia farinosa - Lemaireocereus thurberi - Bursera microphylla* Association | Warren et al. 1981 |  |
| < | \*154.1272 *Cercidium microphyllum - Ambrosia deltoidea - Lemaireocereus thurberi - Jatropha* spp. Association | Warren et al. 1981 |  |
| < | 154.127 *Cercidium microphyllum - Lemaireocereus thurberi* Association | Warren et al. 1981 |  |
| < | *Acamptopappo sphaerocephali-Larreetum tridentatae* | Peinado et al. 1995c |  |
| < | *Agavo cerulatae - Idrietum columnaris* | Peinado et al. 1995c |  |
| < | *Agavo cerulatae - Idrietum columnaris* | Peinado et al. 1997 |  |
| ? | *Ambrosia deltoidea / Parkinsonia microphylla / Bursera microphylla* (Bursage/Foothill Palo Verde/Elephant Tree) | Malusa 2003 |  |
| < | *Ambrosio chenopodifoliae-Larreetum tridentatae* | Peinado et al. 1995c |  |
| < | *Atriplici julaceae-Frankenietum palmeri* | Peinado et al. 2008 |  |
| < | *Atriplici linearis-Frankenietum palmeri* | Peinado et al. 2006 |  |
| < | *Bergerocacto emoryi - Agavetum shawii* | Peinado et al. 1994a |  |
| < | *Bergerocacto emoryi - Agavetum shawii* | Peinado et al. 1995c |  |
| < | *Bergerocacto emoryi - Agavetum shawii* | Peinado et al. 2007 |  |
| < | *Burseretum hindsiano-microphyllae* | Peinado et al. 1995c |  |
| < | *Cercidio microphylli-Carnegieetum giganteae* | Peinado et al. 1995c |  |
| < | *Dudleyo cultratae - Lycietum californici* | Peinado et al. 2008 |  |
| < | *Dudleyo cultratae - Lycietum californici* | Peinado et al. 1997 |  |
| < | *Echinocereo engelmannii-Agavetum deserti* | Peinado et al. 1995c |  |
| < | *Ephedro californicae-Lycietum brevipedis* | Peinado et al. 2005 |  |
| < | *Errazurizio benthamii-Pachycormetum veatchianae* | Peinado et al. 2005 |  |
| < | *Errazurizio megacarpae-Ephedretum trifurcae* | Peinado et al. 2006 |  |
| < | *Euphorbio californicae-Fouquierietum diguetii* | Peinado et al. 1995c |  |
| < | *Euphorbio miserae - Lycietum californici* | Peinado et al. 2008 |  |
| < | *Euphorbio miserae - Lycietum californici* | Peinado et al. 2007 |  |
| < | *Eurotio lanatae-Larreetum tridentatae* | Peinado et al. 1995c |  |
| < | *Fouquierio splendentis-Larreetum tridentatae* | Peinado et al. 1995c |  |
| < | *Jatropho cordatae-Cyrtocarpetum edulis* | Peinado et al. 2011a |  |
| < | *Lycium californicum* (California desert-thorn) Provisional Alliance | Sawyer et al. 2009 | 33.365.00 |
| < | *Opuntia littoralis* (Coast prickly pear scrub) Alliance | Sawyer et al. 2009 | 32.150.00 |
| < | *Opuntio basilaris-Larretum tridentatae* | Peinado et al. 1995c |  |
| < | *Opuntio taponae-Agavetum subcerulatae* | Peinado et al. 1995c |  |
| < | *Opuntio taponae-Burseretum microphyllae* | Peinado et al. 2005 |  |
| < | *Pachycereo schottii-Prosopidetum torreyanae* | Peinado et al. 2008 |  |
| < | *Roso minutifoliae-Aesculetum parryi* | Peinado et al. 1995c |  |
| < | *Suaedo taxifoliae-Allenrolfeetum occidentalis* | Peinado et al. 2005 |  |
| < | *Tidestromio oblongifoliae-Atriplicetum hymenelytrae* | Peinado et al. 1995c |  |
| < | *Yucco validae - Fouquierietum diguettii* | Peinado et al. 1997 |  |
| < | *Yucco validae - Fouquierietum diguettii* | Peinado et al. 1995c |  |
| < | Arizona Upland: *Cercidium-Opuntia* region | Shreve and Wiggins 1964 |  |
| > | Blackbush (212) | Shiflet 1994 |  |
| < | Cactus Scrub | Munz 1968 |  |
| < | Cactus-Mesquite-Saltbush Series | Turner 1982a |  |
| > | Central Gulf Coast Subdivision | Turner 1982a |  |
| < | Copal-Torote ("Central Gulf Coast") Series, *Jatropha cinerea-Bursera microphylla* Association - 154.141 | Brown et al. 1979 |  |
| > | Creosote Bush Scrub | Holland and Keil 1995 |  |
| < | Creosote Bush Scrub | Munz 1968 |  |
| < | Creosote Bush Scrub (211) | Shiflet 1994 |  |
| < | Creosotebush - Bursage (506) | Shiflet 1994 |  |
| < | Creosotebush-Big Galleta Scrub Natural Community | Hall et al. 2001 |  |
| < | Creosotebush-Bursage Desert Scrub Natural Community | Hall et al. 2001 |  |
| < | Dune Complex and Dune Endemics Natural Community | Hall et al. 2001 |  |
| < | Elephant Tree-Limberbush on Xeric Rocky Slopes Natural Community - 6.2.10 | Hall et al. 2001 |  |
| = | Lower Colorado River Valley: *Larrea-Franseria* region | Shreve and Wiggins 1964 |  |
| < | Microphyll Woodland | Munz 1968 |  |
| < | Mohave Desertscrub, Bladdersage Series - 153.14 | Brown et al. 1979 |  |
| < | Mohave Desertscrub, Bladdersage Series, *Salazaria mexicana* Association - 153.141 | Brown et al. 1979 |  |
| < | Mohave Desertscrub, Creosotebush Series - 153.11 | Brown et al. 1979 |  |
| < | Mohave Desertscrub, Creosotebush Series, *Larrea divaricata-Ambrosia dumosa* Association - 153.112 | Brown et al. 1979 |  |
| < | Mohave Desertscrub, Creosotebush Series, *Larrea divaricata* Association - 153.111 | Brown et al. 1979 |  |
| = | Palo Verde - Cactus (507) | Shiflet 1994 |  |
| < | Paloverde-Mixed Cacti ("Arizona Upland") Series, *Ambrosia deltoides-Carnegia gigantea*-mixed scrub Association - 154.122 | Brown et al. 1979 |  |
| < | Paloverde-Mixed Cacti ("Arizona Upland") Series, *Ambrosia deltoides-Cercidium microphyllum*-mixed scrub Association - 154.121 | Brown et al. 1979 |  |
| < | Paloverde-Mixed Cacti ("Arizona Upland") Series, Mixed scrub-*Cercidium microphyllum-Olneya tesota* mixed scrub Association - 154.127 | Brown et al. 1979 |  |
| < | Paloverde-Mixed Cacti-Mixed Scrub on Bajadas Natural Community | Hall et al. 2001 |  |
| < | Paloverde-Mixed Cacti-Mixed Scrub on Rocky Slopes Natural Community | Hall et al. 2001 |  |
| < | Psammophytic Scrub | Munz 1968 |  |
| > | Sonoran Desertscrub, Agave-Bursage ("Vizcaino") Series - 154.15 | Brown et al. 1979 |  |
| > | Sonoran Desertscrub, Copal-Torote ("Central Gulf Coast") Series - 154.14 | Brown et al. 1979 |  |
| = | Tropical-Subtropical Desertlands; Sonoran Desertscrub - 154.1 | Brown et al. 1979 |  |
| = | Warm Temperate Desertlands; Mohave Desertscrub - 153.1 | Brown et al. 1979 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D.E. Brown, C.H. Lowe, and C.P. Pase (1979)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and T. Keeler-Wolf

Acknowledgments [optional]:

Version Date: 27 Jan 2016

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3. Desert & Semi-Desert

3.A.2.Na. North American Warm Desert Scrub & Grassland

M089. Viscaino-Baja California Desert Scrub

Type Concept Sentence: This is the major macrogroup of the Baja California peninsula and is characterized by xeromorphic trees, tall shrubs and cacti with or without shorter desert scrub. Characteristic species such as *Bursera fagaroides var. elongata, Bursera hindsiana, Bursera microphylla, Fouquieria columnaris, Fouquieria diguetii, Fouquieria peninsularis, Fouquieria splendens, Jatropha cuneata, Pachycereus pringlei, Pachycereus schottii, Pachycormus discolor, Parkinsonia microphylla, Stenocereus thurberi*, and *Viguiera laciniata* may be present to dominant. Short-statured salt desert scrub *Frankenia palmeri* with *Atriplex* spp., such as *Atriplex julacea* or *Atriplex polycarpa*, and San Lucan tropical thornscrub are also included in this macrogroup.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Na. North American Warm Desert Scrub & Grassland (D039)

Elcode: M089

\*Scientific Name: Viscaino-Baja California Desert Scrub Macrogroup

\*Common (Translated Scientific) Name: Mexican Giant Cardon - Boojum Tree - Elephant-tree Viscaino-Baja California Desert Scrub Macrogroup

\*Colloquial Name: Viscaino-Baja California Desert Scrub

\*Type Concept: This macrogroup comprises most of the Baja California. The vegetation is characterized by xeromorphic trees, tall shrubs and cacti with shorter salt desert scrub common. Short-statured salt desert scrub stands and San Lucan tropical thornscrub are also included in this macrogroup. Characteristic species such as *Bursera fagaroides var. elongata, Bursera hindsiana, Bursera microphylla, Fouquieria columnaris, Fouquieria diguetii, Fouquieria peninsularis, Fouquieria splendens, Jatropha cuneata, Pachycereus pringlei, Pachycereus schottii, Pachycormus discolor, Parkinsonia microphylla, Stenocereus thurberi*, and *Viguiera laciniata* may be present to dominant. Scattered shrubs and cacti include *Acacia brandegeana, Acalypha californica, Agave shawii, Ambrosia camphorata, Ambrosia chenopodiifolia, Ambrosia dumosa, Ambrosia magdalenae, Echinocereus maritimus, Encelia californica, Encelia farinosa, Eriogonum fasciculatum, Ferocactus cylindraceus, Fouquieria splendens, Hyptis emoryi, Jatropha cinerea, Justicia californica, Larrea tridentata, Lysiloma candida, Cylindropuntia acanthocarpa, Cylindropuntia bigelovii, Cylindropuntia cholla, Cylindropuntia prolifera, Simmondsia chinensis, Solanum hindsianum*, and *Yucca schidigera*. Salt desert scrub species include *Frankenia palmeri* often with *Atriplex julacea* or *Atriplex polycarpa*. The San Lucan tropical thornscrub is a complex mixture of low thorn-bearing trees, shrubs, and a high diversity of succulents, including cacti, with tallest individuals typically not exceeding 3 m in height. Diagnostic species include *Bursera microphylla, Jatropha cinerea, Pachycereus pringlei, Solanum hindsianum*, and *Stenocereus gummosus*. This macrogroup comprises most of the Baja California peninsula extending north along the Gulf of California coastal plains to the lower Colorado River Valley south along the west coast of Sonora south to Guaymas, including the major islands. This desert scrub macrogroup occurs in diverse environments from the coast and inland plains to alluvial fans, foothills, and mountains. Climate is extremely arid with mean annual precipitation of less than 100 mm in the north increasing to 300 mm in southern Baja. Substrates vary from coarse-textured, deep granitic soils and a'a lava flows in broad valley bottoms, alluvial fans and on lower mountain slopes to finer-textured, alkaline, sometimes saline, clayey soils with low infiltration that are derived from marine deposit, basalt or other volcanic rock.

\*Diagnostic Characteristics: The vegetation of this macrogroup is quite variable, including xeromorphic trees and/or tall shrubs and cacti with or without the shorter desert scrub common elsewhere in the Sonoran Desert. Species such as *Bursera fagaroides var. elongata, Bursera hindsiana, Bursera microphylla, Fouquieria columnaris, Fouquieria diguetii, Fouquieria peninsularis, Fouquieria splendens, Fouquieria splendens, Jatropha cuneata, Pachycereus pringlei, Pachycereus schottii, Pachycormus discolor, Parkinsonia microphylla, Stenocereus thurberi*, and *Viguiera laciniata* characterize the vegetation of the typically open stands. Salt desert scrub is also included in this macrogroup and is characterized by *Frankenia palmeri* often with *Atriplex julacea* or *Atriplex polycarpa*.

\*Classification Comments: This macrogroup is based on three of Shreve's seven Sonoran Desert subdivisions (Shreve 1951, Shreve and Wiggins 1964) as modified by Brown et al. (1979) and later described by Turner and Brown (1982) in descriptions of the Viscaino, Magdalena Plain, and Central Gulf Coast subdivisions. It is floristically and environmentally diverse, being composed of three NVC groups and 13 NatureServe terrestrial ecological systems. The macrogroup comprises the central and lower portions of the Baja California peninsula, lacking only the northern portion of the western Baja California del Norte where California chaparral extends south. Stands also extend around the Gulf of California into western Sonora and the major islands. This macrogroup does not include ~Baja Semi-Desert Coastal Succulent Scrub (CES206.934)$$ and ~Sonoran Gulf of California Coast Tall Succulent Desert Scrub (CES302.016)$$.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M088 | Mojave-Sonoran Semi-Desert Scrub | occurs adjacent in northern Baja California del Norte and may share some common dominant species such as *Agave shawii, Lycium californicum, Cylindropuntia californica var. parkeri, Opuntia littoralis, Cylindropuntia prolifera, Rhus integrifolia, Simmondsia chinensis*, and *Yucca schidigera*. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is quite variable physiognomically and may include short xeromorphic trees and/or tall shrubs, short and/or tall cacti, rosette stem succulents such as agave and yucca, and various other evergreen and drought-deciduous short broad-leaved shrubs. If present, the herbaceous layer is typically sparse.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The vegetation of this macrogroup is quite variable, including xeromorphic trees and/or tall shrubs and cacti stands with or without the shorter salt desert scrub common elsewhere in the Sonoran Desert. Characteristic species such as *Bursera fagaroides var. elongata, Bursera hindsiana, Bursera microphylla, Fouquieria columnaris, Fouquieria diguetii, Fouquieria peninsularis, Fouquieria splendens, Jatropha cuneata, Pachycereus pringlei, Pachycereus schottii (= Lophocereus schottii), Pachycormus discolor, Parkinsonia microphylla, Stenocereus thurberi*, and *Viguiera laciniata* may be present to dominant. Scattered shrubs and cacti include *Acacia brandegeana, Acalypha californica, Agave shawii, Ambrosia camphorata, Ambrosia chenopodiifolia, Ambrosia dumosa, Ambrosia magdalenae, Echinocereus maritimus, Encelia californica, Encelia farinosa, Eriogonum fasciculatum, Ficus palmeri, Ferocactus cylindraceus, Fouquieria splendens, Hyptis emoryi, Jatropha cinerea, Justicia californica, Larrea tridentata, Lysiloma candida, Cylindropuntia acanthocarpa (= Opuntia acanthocarpa), Cylindropuntia bigelovii (= Opuntia bigelovii), Cylindropuntia cholla (= Opuntia cholla), Cylindropuntia prolifera (= Opuntia prolifera), Simmondsia chinensis, Solanum hindsianum*, and *Yucca schidigera*.

Exceptions to the tall-shrub layer include the salt desert scrub stands characterized by an open shrub layer dominated by *Frankenia palmeri* often with *Atriplex* spp. such as *Atriplex julacea* or *Atriplex polycarpa* without species of *Agave*. Other species may include the cacti *Cylindropuntia fulgida (= Opuntia fulgida)* and *Ferocactus cylindraceus (= Ferocactus acanthodes)*. Scattered *Encelia farinosa, Euphorbia misera, Fouquieria splendens, Jatropha cuneata, Larrea tridentata, Lycium californicum*, or *Prosopis glandulosa var. torreyana* may occur in drainages in less saline, gravelly soils. Annuals are seasonally important.

The San Lucan tropical thornscrub included in this macrogroup forms a transition between succulent-rich Sonoran Desert scrub types and San Lucan dry deciduous forest forming a complex mixture of low thorn-bearing trees, shrubs, and a high diversity of succulents, including cacti, with tallest individuals typically not exceeding 3 m in height. Diagnostic species include *Bursera microphylla, Jatropha cinerea, Pachycereus pringlei, Solanum hindsianum*, and *Stenocereus gummosus (= Machaerocereus gummosus)*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Periodic severe drought is common in Baja California which favors plants that can store water during the unfavorable times.

ENVIRONMENT

Environmental Description: This desert scrub macrogroup comprises most of the Baja California peninsula and occurs in diverse environments from the coastal and inland plains to alluvial fans, foothills, and mountains. Climate is extremely arid with mean annual precipitation of less than 100 mm in the north increasing to 300 mm in southern Baja. Precipitation occurs mostly in the summer-early fall season (monsoon). Extended drought is common and favors plants with water storage. Coastal stands west of the mountain divide may benefit from cool sea breezes and fog that help ameliorate some of the aridity. Some vegetation types, such as *Frankenia-Ocotillo-Datilillo* desert scrub are limited to the fog belt in the coastal plain of southern Viscaino. Substrates vary from coarse-textured, deep granitic soils and a'a lava flows in broad valley bottoms, alluvial fans and on lower mountain slopes to finer-textured, alkaline, sometimes saline, clayey soils with low infiltration that are derived from marine deposit, basalt or other volcanic rock. Some stands occur in narrow valleys and rocky slopes below generally sparsely vegetated volcanic mesas. Soil is present and moisture is available locally in seeps from these mesas. Larger valleys or barrancas are typically drier and have more open vegetation than smaller ones. An exception to the extremely arid environments is the tropical San Lucan thornscrub, which is limited in distribution to central and southern Baja California. These areas receive more precipitation (316-482 mm) per year, with a dry season from late October through July. Mean monthly temperatures range from 21.5-23.6°C. Pacific slopes receive greater rainfall and experience generally lower temperatures than the gulf side of the Cape region.

DISTRIBUTION

\*Geographic Range: This macrogroup comprises the Vizcaino and Magdalena regions in central and southern Baja California peninsula extending northeast of the crest along the Gulf of California coastal plains to the lower Colorado River Valley south along the west coast of Sonora south to Guaymas, including the major islands, but lacking the Pacific side of northern Baja California del Norte where California chaparral extends south.

Nations: MX

States/Provinces: MXBC

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]: Moderate

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G297 | Baja California del Norte Gulf Coast Ocotillo - Limberbush - Creosotebush Desert Scrub |
| G558 | Viscaino-Baja California Desert Scrub |
| G774 | Viscaino-Baja California Salt Desert Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Agave-Bursage (Vizcaino) Series - 154.15 | Brouillet et al. 1998 |  |
| < | Agave-Bursage (Vizcaino) Series - 154.15 | Brown et al. 1979 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and T. Keeler-Wolf

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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3. Desert & Semi-Desert

3.A.2.Na. North American Warm Desert Scrub & Grassland

M117. North American Warm Semi-Desert Cliff, Scree & Rock Vegetation

Type Concept Sentence: This macrogroup consists of a variety of near barren and sparsely vegetated substrates in the southwestern U.S. and northern Mexico, including Baja California, including coastal areas, saline plains, desert pavement, rocky slopes, cliffs, and outcrops in foothills, canyons and desert mountain ranges.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Na. North American Warm Desert Scrub & Grassland (D039)

Elcode: M117

\*Scientific Name: *Fouquieria splendens - Atriplex hymenelytra - Amaranthus watsonii* North American Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Ocotillo - Desert-holly - Watson's Amaranth North American Rock Vegetation Macrogroup

\*Colloquial Name: North American Warm Semi-Desert Cliff, Scree & Rock Vegetation

\*Type Concept: This macrogroup consists of near barren and sparsely vegetated landscapes on a variety of substrates across the southwestern U.S. and northern Mexico, including Baja California. It may be divided into two main groups: pavement, badlands, and outcrops or southwestern North American dunes and sandsheets. Vegetation is variable depending on environmental factors of the sites, which range from below sea level to foothill and lower montane elevations. Lower elevation sites often have herbaceous or shrub species present, whereas foothill and lower montane sites may also include scattered trees. Most of the tree species also occur in non-sparse vegetation groups. Common species of the Sonoran Desert include *Amaranthus watsonii, Eucnide rupestris, Ficus* spp., *Hofmeisteria* spp., *Maytenus phyllanthoides, Nicotiana obtusifolia*, and *Pleurocoronis laphamioides* [excluded]. In the alluvial fans and low mountains of the Mojave Desert and adjacent Sonoran Desert, differential shrubs include *Atriplex hymenelytra* and *Atriplex confertifolia* (basic to alkali substrate), *Nolina bigelovii, Peucephyllum schottii*, and *Pleurocoronis pluriseta*. Thorny and stem succulent shrubs such as *Echinocactus polycephalus, Fouquieria splendens, Ferocactus cylindraceus*, and *Cylindropuntia bigelovii* may be present. The nearly ubiquitous Mojave and Sonoran desert shrubs *Larrea tridentata* and *Encelia farinosa* are often present in rocky Mojave Desert stands, while at higher elevations in the desert mountains, *Eriogonum fasciculatum, Eriogonum heermannii*, and *Ericameria cuneata* occur. Calciphile species such as *Agave utahensis, Buddleja utahensis, Ephedra funerea, Petrophytum caespitosum*, and *Salvia funerea* occur on limestone and marble outcrops. Certain annual herbs such as *Perityle* sp. are particularly characteristic of these massive outcrops.

Nonvascular (lichens) plants are the predominant lifeform in some desert areas of higher precipitation. Species diagnostic of desert pavements and badland clay flats or mud hills are composed primarily of ephemeral annuals, which disclose themselves only in years of favorable precipitation. Several herbaceous species such as *Eriogonum inflatum, Coreopsis* sp., and *Plantago ovata* may occur on both clay-rich flats and mud hills, or on desert pavements, while others such as *Chorizanthe rigida* and *Geraea canescens* are most characteristic of pavements (so called due to the oxidized patina which slowly accumulates on surface rocks and pebbles), which are often underlain by a cemented duripan of calcium carbonate (caliche) making them impervious to roots of larger desert shrubs. Several species of annual *Eriogonum* spp. as well as *Chorizanthe* spp. may occur on pavements in the northern Sonoran and Mojave deserts. Another suite of annual ephemeral species are diagnostic of mud hills and flats, such as *Coreopsis calliopsidea*, and *Eriogonum trichopes* (Mojave).

Landforms include cliffs, narrow canyons, and smaller rock outcrops in desert mountains; pebbly pavement in xeric basins and alluvial fans; and upland areas around playas and washes. Sparse vegetation also occurs on special substrates such as shale or mudstone outcrops in badlands and volcanic deposits such as tuff and basal lava. Rock substrates include bedrock and unstable talus slopes in desert mountains. Some substrates, such as marine shales, are strongly alkaline and/or saline, which chemically limits plant growth. Active substrates such as scree slopes are difficult sites for plants to grow. Physical properties of substrates may also limit plant growth. Badland sites often have heavy clay soils that reduce water infiltration or availability (colloidal binding), increasing erosion rates and reducing soil moisture for plants.

\*Diagnostic Characteristics: Diagnostic characteristics of this macrogroup are its substrates, which are sparsely vegetated by vascular plants, and its geographic location in the southwestern U.S. and northern Mexico, including Baja California. Vegetation is variable; however, it is often composed of scattered shrubs, perennial herbs (particularly cushion plants) and annual herbs that are adapted to the harsh environmental conditions that are making the site sparse, although either may be absent on a given site. Nonvascular species, especially lichens but also algae, bacteria, and mosses, are important on some sites as they represent the early stages of primary succession. Biological soil crusts (associations of nonvascular species) can be particularly important and diverse (based on substrate, moisture availability, disturbance, etc.) and may dominate the site (Belnap and Lange 2003).

\*Classification Comments: This macrogroup is very diverse floristically, often composed of ephemeral annuals, and more information is needed to sort out indicator species. What is diagnostic is the sparse cover of vascular plants and/or presence and sometimes dominance of nonvascular (lichen) species. This broadly defined macrogroup is similar to the single group included in it, ~North American Warm Semi-Desert Cliff, Scree & Pavement Sparse Vegetation Group (G569)$$, and it may or may not need to be split. This group is broadly defined and may need to be split into additional groups representing finer concepts of sparsely vegetated substrates/landforms such as rockland, scree and cliffs, desert pavements, or shale badlands or clay hills.

There is some discussion whether all of the sparsely vegetated portions of ~North American Warm Semi-Desert Dune & Sand Flats Group (G675)$$, which is currently included in ~Mojave-Sonoran Semi-Desert Scrub Macrogroup (M088)$$, should be included in this macrogroup with G569. The concept of a group including semi-desert sea cliffs in Baja, Mexico, and saline flats needs to be developed as coastal sparse vegetation could be expected to have different floristics due to proximity of salt spray. These new groups will be used to further refine the concept of this macrogroup or to define a related macrogroup.

T. Keeler-Wolf pers. comm. (2014): The sparsely vegetated desert macrogroup is limited by real field data; since these types are only expressed during El Niño years, it is hard to obtain. Some commentary from other ecologists (J. Evens pers. comm. 2014) emphasize the likely low diagnostic value of some of the species I listed (e.g., *Eriogonum nudum, Chorizanthe rigida, Geraea canescens*), since these species are also found in harsher desert shrublands as well. However, the strong presence of these in high cover in favorable rainfall years, in consort with the paucity of very many diagnostic woody species, enables these ephemeral herbs to be used as differentials. In other words, the sparsely vegetated desert landscapes are the least favorable settings for any vascular plant species, so the species that are present consistently there are also "diagnostic" of these harsh settings. There are reasonable diagnostic shrubs for the massive sparsely vegetated rock outcrop portion of G569. The affinity of species such as *Peucephyllum schottii, Pleurocoronis pluriseta, Ephedra funerea, Salvia funerea*, etc. to sparsely vegetated rock outcrops is expected to be relatively high, once more synoptic data are available.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M088 | Mojave-Sonoran Semi-Desert Scrub | includes sparse vegetation (1-9 % total cover), as well, and non-sparse vegetation occurring on dunes and sandsheets. |
| M118 | Intermountain Basins Cliff, Scree & Badland Sparse Vegetation | criteria are needed to determine where this macrogroup (M117) transitions into this cool desert macrogroup (M118). |

Similar NVC Types General Comments [optional]: Criteria as to where ~North American Warm Semi-Desert Cliff, Scree & Rock Vegetation Macrogroup (M117)$$ transitions into the cool desert ~Intermountain Basins Cliff, Scree & Badland Sparse Vegetation Macrogroup (M118)$$ need to be determined. Vegetation in ~North American Warm Semi-Desert Dune & Sand Flats Group (G675)$$ is included in ~Mojave-Sonoran Semi-Desert Scrub Macrogroup (M088)$$.

VEGETATION

Physiognomy and Structure Summary: This lithomorphic macrogroup may be composed of woody plants, including both trees and shrubs, herbaceous plants, and/or nonvascular plants. Shrubs are especially common and were chosen as indicator species; however, herbs (especially cushion plants) and nonvasculars such as mosses or lichens may be more common. Lichen species could have been used as nonvascular organisms are important and often dominate stands of this macrogroup.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Vegetation is variable depending on environmental factors of the sites, which range from sea level to foothill/lower montane elevations. Lower elevation sites often have herbaceous or shrub species present, whereas foothill, montane and subalpine sites may also include trees. Most of the species also occur in non-sparse vegetation groups. Common coastal species include *Amaranthus watsonii, Eucnide rupestris, Ficus* spp., *Hofmeisteria* spp., *Maytenus phyllanthoides, Nicotiana obtusifolia (= Nicotiana trigonophylla)*, and *Pleurocoronis laphamioides* [excluded]. In the foothills and low mountains, *Bursera microphylla, Fouquieria splendens, Juniperus deppeana, Nolina bigelovii, Cylindropuntia bigelovii (= Opuntia bigelovii)*, and *Pinus discolor* are often present. On harsh shaly substrates, *Atriplex hymenelytra* is common. Mud hills and badlands may just have scattered annual herbs, especially *Eriogonum trichopes*. Gypsum hills often have scattered plants such as *Argemone munita, Nicotiana* spp., *Peucephyllum schottii*, and annual *Eriogonum* spp. The nearly ubiquitous *Larrea tridentata* and *Eriogonum fasciculatum* are often present on pavement and rocky slopes. At higher elevations in the desert mountains, *Eriogonum fasciculatum, Eriogonum heermannii*, and *Ericameria cuneata* occur. Calciphile species such as *Agave utahensis, Buddleja utahensis, Petrophytum caespitosum, Salvia funerea*, and *Ephedra funerea* occur on limestone and marble outcrops. Certain annual herbs such as *Perityle* sp. are particularly characteristic of these massive outcrops.

Nonvascular (lichens) plants and biological soil crusts (e.g., associations of algae, bryophytes, cyanobacteria, lichens, liverworts, and microfungi) are the predominant lifeform in some areas. Species diagnostic of desert pavements and badlands clay flats or mud hills are composed primarily of ephemeral annuals, which disclose themselves only in years of favorable precipitation and temperature. Several herbaceous species such as *Camissonia* spp., *Chaenactis* spp., *Coreopsis* sp., *Eriogonum inflatum*, and *Plantago ovata* may occur on both clay-rich flats and mud hills, or on desert pavements. Others, such as *Chorizanthe rigida* and *Geraea canescens*, are characteristic of pavements (so called due to the oxidized patina which slowly accumulates on surface rocks and pebbles), which are often underlain by a cemented duripan of calcium carbonate (caliche) making them impervious to roots of larger desert shrubs. Several species of annual *Eriogonum* as well as *Chorizanthe* may occur on pavements in the northern Sonoran and Mojave deserts. Another suite of annual ephemeral species are diagnostic of mud hills and flats, such as *Coreopsis calliopsidea* and *Eriogonum trichopes* (Mojave).

Floristic information was compiled from Shreve and Wiggins (1964), Brown (1982a), Barbour and Major (1988), MacMahon (1988), Dick-Peddie (1993), Sawyer and Keeler-Wolf (1995), Keeler-Wolf et al. (1998), Belnap and Lange 2003, Barbour et al. (2007), Keeler-Wolf (2007), Schoenherr and Burk (2007), and Sawyer et al. (2009).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: These sparsely vegetated plant communities often represent primary succession on parent materials such as bare rock outcrops or disturbance-maintained communities such as scree and talus slopes that are frequently disturbed and constantly re-establishing themselves. Biological soil crusts can improve soil stability and soil fertility, and disturbances such as grazing and non-native species invasion can negatively impact these crusts (Belnap and Eldridge 2003, Belnap et al. 2006).

ENVIRONMENT

Environmental Description: This macrogroup occurs on near barren or sparsely vegetated landscapes on a variety of substrates across the Chihuahuan, Sonoran, and Mojave deserts, extending into Baja California. Landforms include cliffs, narrow canyons, and smaller rock outcrops and scree slopes in foothills and desert mountains; pebbly pavement in desert basins and alluvial fans; upland areas around playas and washes, saline coastal plains, clay hills, gypsum outcrops, rocky slopes, cliffs, and rock outcrops in foothills.

Geology is variable and includes igneous, sedimentary, and metamorphic rock types such as shale or mudstone outcrops in badlands and volcanic deposits such as tuff and basalt lava. Rock substrates also include bedrock and unstable scree slopes in mountains. Some substrates, such as marine shales, are strongly alkaline and/or saline which chemically limits plant growth. Active substrates such as scree slopes are difficult sites for plants to grow. Physical properties of substrates may also limit plant growth. Badland sites often have heavy clay soils that decease water infiltration, increase erosion rates and reduce soil moisture for plants. Environmental information was compiled from Shreve and Wiggins (1964), Brown (1982a), Barbour and Major (1988), MacMahon (1988), Dick-Peddie (1993), Sawyer and Keeler-Wolf (1995), Barbour et al. (2007), Keeler-Wolf (2007), Schoenherr and Burk (2007), and Sawyer et al. (2009).

DISTRIBUTION

\*Geographic Range: This macrogroup occurs in scattered locations across the southwestern U.S. and northern Mexico in the Chihuahuan, Mojave, and Sonoran deserts extending to Baja California and including coastal areas and islands in the Gulf of California.

Nations: MX, US

States/Provinces: AZ, CA, MXBC, MXBS, MXCH, MXSO, NM, NV, TX

USFS Ecoregions (2007) [optional]: 313A:CC, 313B:CC, 313C:CC, 313D:CC, 315A:CC, 315B:CC, 315H:CC, 321A:CC, 322A:CC, 322B:CC, 322C:CC, 341F:CC, M313A:CC, M313B:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G569 | North American Warm Semi-Desert Cliff, Scree & Pavement Sparse Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: K.A. Schulz, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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3. Desert & Semi-Desert

3.A.2.Na. North American Warm Desert Scrub & Grassland

M092. North American Warm-Desert Xeric-Riparian Scrub

Type Concept Sentence: This macrogroup covers shrublands and grasslands along intermittent streams and washes dominated by shrubs such as *Acacia greggii, Baccharis sarothroides, Bebbia juncea, Brickellia laciniata, Chilopsis linearis, Ephedra californica, Ericameria paniculata, Fallugia paradoxa, Hymenoclea salsola, Hymenoclea monogyra, Hyptis emoryi, Olneya tesota, Parkinsonia florida, Salazaria mexicana*, and/or *Viguiera reticulata* and herbs such as *Panicum bulbosum, Alopecurus aequalis*, or *Lycurus phleoides*, that are found within the warm temperate deserts of western North America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Na. North American Warm Desert Scrub & Grassland (D039)

Elcode: M092

\*Scientific Name: North American Warm-Desert Xeric-Riparian Scrub Macrogroup

\*Common (Translated Scientific) Name: North American Warm-Desert Xeric-Riparian Scrub Macrogroup

\*Colloquial Name: North American Warm-Desert Xeric-Riparian Scrub

\*Type Concept: This macrogroup consists of variable vegetation of desert washes ranging from sparse and patchy to moderately dense, and typically occurs along the edges or in the channel bottoms. A woody layer is usually present and is typically intermittent to open and may be dominated by shrubs and small trees such as *Acacia greggii, Baccharis sarothroides, Bebbia juncea, Brickellia laciniata, Chilopsis linearis, Ephedra californica, Ericameria paniculata, Fallugia paradoxa, Hymenoclea salsola, Hymenoclea monogyra, Hyptis emoryi, Juglans microcarpa, Lepidospartum squamatum, Olneya tesota, Parkinsonia florida, Prosopis* spp., *Psorothamnus spinosus, Prunus fasciculata, Rhus microphylla, Salazaria mexicana, Sarcobatus vermiculatus*, and/or *Viguiera reticulata*. A few known herbaceous communities dominate intermittent drainages and washes with woody vegetation absent or only with scattered individuals present. Dominant species include *Eriogonum* spp., *Mirabilis laevis, Penstemon* spp., *Panicum bulbosum, Alopecurus aequalis*, or *Lycurus phleoides*. This macrogroup occurs on intermittently flooded washes or arroyos that dissect bajadas, mesas, plains and basin floors throughout the warm deserts of the western U.S. and northwestern Mexico.

\*Diagnostic Characteristics: Characteristic species of shrubs and small trees may include *Acacia greggii, Brickellia laciniata, Baccharis sarothroides, Chilopsis linearis, Ephedra californica, Ericameria paniculata, Fallugia paradoxa, Hymenoclea salsola, Hymenoclea monogyra, Hyptis emoryi, Juglans microcarpa, Lepidospartum squamatum, Olneya tesota, Parkinsonia florida, Prosopis* spp., *Psorothamnus spinosus, Prunus fasciculata, Rhus microphylla, Salazaria mexicana*, and *Viguiera reticulata*.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup has an open to dense woody layer, or an herbaceous layer, or it may be very sparsely vegetated.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: A woody layer is usually present and is typically open-canopy, or more often clumpy and may be dominated by shrubs and small trees such as *Acacia greggii, Baccharis sarothroides, Bebbia juncea, Brickellia laciniata, Chilopsis linearis, Ephedra californica, Ericameria paniculata, Fallugia paradoxa, Forestiera pubescens, Hymenoclea salsola, Hymenoclea monogyra, Hyptis emoryi, Juglans microcarpa, Lepidospartum squamatum, Olneya tesota, Parkinsonia florida, Prosopis pubescens, Psorothamnus spinosus, Prunus fasciculata, Rhus microphylla, Salazaria mexicana, Sarcobatus vermiculatus*, and/or *Viguiera reticulata*. Additional species characteristic of Tamaulipan stands are *Vachellia farnesiana (= Acacia farnesiana), Celtis ehrenbergiana (= Celtis pallida), Haematoxylum brasiletto, Prosopis glandulosa*, and *Tecoma stans*. Sometimes herbaceous vegetation dominates the wash with woody vegetation absent or only with scattered individuals present. Dominance by *Eriogonum* spp., *Mirabilis laevis, Penstemon* spp., *Panicum bulbosum, Alopecurus aequalis*, or *Lycurus phleoides* is typical of some herbaceous stands, although it is variable.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: This macrogroup is associated with flash flooding and rapid sheet and gully flows that scour channel bottoms. The vegetation is sparse both from the high impact of flooding and the lack of moisture for the rest of the year.

ENVIRONMENT

Environmental Description: This macrogroup occurs on intermittently flooded washes or arroyos that dissect bajadas, mesas, plains and basin floors. These are linear features found across the North American warm deserts that experience ephemeral surface waterflows. Soils are well-drained. The macrogroup also sometimes occurs on colluvial, rocky slopes and on sites from disturbed by fire or clearing.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs throughout the warm deserts of the southwestern U.S. and northern Mexico.

Nations: MX, US

States/Provinces: AZ, CA, MXBC, MXCH, MXCO, MXNU, MXSO, MXTM, NM, NV, TX

USFS Ecoregions (2007) [optional]: 261B:CC, 313A:CC, 313B:CP, 313C:CC, 313D:C?, 315A:CC, 315B:CC, 315H:CC, 321A:CC, 322A:CC, 322B:CC, 322C:CC, 341E:C?, 341F:CC, M261E:PP, M313A:CC, M313B:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G541 | Warm Semi-Desert Shrub & Herb Dry Wash & Colluvial Slope |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Arroyo Riparian | Dick-Peddie 1993 |  |
| < | Mojave Wash Vegetation | Keeler-Wolf 2007 |  |
| < | Ramadero | Jahrsdoerfer and Leslie 1988 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz, E. Muldavin, and G. Kittel

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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3. Desert & Semi-Desert

3.A.2.Na. North American Warm Desert Scrub & Grassland

M512. North American Warm Desert Ruderal Scrub & Grassland

Type Concept Sentence: This upland warm desert thornscrub and grassland macrogroup contains disturbed semi-arid grasslands and desert thornscrub that are dominated by non-native species and are found in the southwestern U.S. and northern Mexico.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.A.2.Na. North American Warm Desert Scrub & Grassland (D039)

Elcode: M512

\*Scientific Name: *Prosopis glandulosa / Bromus rubens - Eragrostis lehmanniana* Desert Ruderal Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Honey Mesquite / Red Brome - Lehmann's Lovegrass Desert Ruderal Scrub & Grassland Macrogroup

\*Colloquial Name: North American Warm Desert Ruderal Scrub & Grassland

\*Type Concept: This macrogroup contains disturbed warm, semi-arid grasslands and desert thornscrub that occur in the southwestern U.S. and northern Mexico. Vegetation of the macrogroup can be a monoculture of a single non-native graminoid species, or a mix of several non-native forbs and graminoids. Perennial graminoids include *Eragrostis curvula, Eragrostis lehmanniana, Pennisetum ciliare, Pennisetum setaceum, Sorghum halepense* (mesic sites), and several other species (which have been purposefully seeded to prevent soil erosion or for livestock forage), and/or invasive non-native annual species such *Brassica tournefortii, Bromus rubens, Schismus arabicus*, and *Schismus barbatus*. Numerous other non-native herbaceous species may be present to dominant. Dense stands of native ruderal species such as *Amaranthus palmeri* or *Solanum elaeagnifolium* resulting from anthropomorphic disturbance are also included in this macrogroup. This macrogroup includes upland desert scrub strongly dominated by invasive native species (*Prosopis glandulosa* and *Prosopis velutina*) with >95% relative cover and >10% absolute shrub cover. *Prosopis* spp.-dominated stands that occur naturally (non-ruderal) in desert lowlands, drainages, washes and riparian areas (bosque) are excluded from this ruderal type. It also includes any desert scrub with an exotic species-dominated understory (>90% relative cover) in the herbaceous layer. Invasive non-native shrublands are less common. Stands occur on flat to moderately steep ground and can vary from large areas (100+ hectares) to narrow strips adjacent to roadsides or under powerlines and other disturbed areas. *Eragrostis curvula*- and *Eragrostis lehmanniana*-dominated stands resulting from artificial seeding as part of grassland restoration projects may be exceptionally large. Soils are variable, but are mostly well-drained. Disturbed soils may be compacted and eroded.

\*Diagnostic Characteristics: This widespread upland semi-desert scrub and grassland macrogroup is dominated by invasive non-native shrubs, grasses or forbs. Widespread dominant and diagnostic species include naturalized, non-native forage species such as *Eragrostis curvula, Eragrostis lehmanniana, Pennisetum ciliare*, and *Sorghum halepense* (mesic sites), and/or invasive non-native annual species such as *Bromus rubens* and *Schismus* spp. Dense stands of native ruderal species such as *Amaranthus palmeri* may also dominate disturbed areas. This macrogroup includes upland desert scrub strongly dominated by invasive native species (*Prosopis glandulosa* and *Prosopis velutina*) with >95% relative cover and >10% absolute shrub cover. It also includes any desert scrub with an exotic species-dominated understory (>90% relative cover) in the herbaceous layer that has >10% absolute cover.

\*Classification Comments: Since native species may be present, this macrogroup may be difficult to differentiate from native grassland macrogroups, particularly in stands with low overall grass cover. But in most stands, non-native species, especially invasive species, clearly outweigh native species in abundance such that what the native plant association counterpart was in the past is not readily apparent. This macrogroup can also include vegetation dominated by native ruderal species when caused by anthropomorphic disturbance, e.g., old fields, reclaimed oil well pads, etc. Although the scrub and annual grasslands may share common areas, they have different phenologies and reproductive strategies (terophytes versus camephytes and phanerophytes). This broad macrogroup could be divided into two (M. Peinado pers. comm. 2014).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M498 | Great Plains Ruderal Grassland & Shrubland | may overlap where vegetation shares wide-ranging non-native species. |
| M493 | Western North American Ruderal Grassland & Shrubland | may overlap where vegetation shares wide-ranging non-native species. |
| M499 | Western North American Cool Semi-Desert Ruderal Scrub & Grassland | is similar but typically characterized by the dominance of cool-season grasses such *Bromus tectorum* or *Agropyron cristatum* that are more cold-tolerant and heat-sensitive. |

Similar NVC Types General Comments [optional]: Vegetation included in this macrogroup is similar to poor-condition natural warm desert scrub and grassland types that have been degraded by, but are not yet dominated by, invasive non-native species, and the native type is still identifiable.

VEGETATION

Physiognomy and Structure Summary: This macrogroup includes ruderal vegetation with an open to dense shrub canopy and/or an herbaceous layer dominated by annual or perennial grasses or forbs.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Vegetation of the macrogroup can be a monoculture of a single non-native graminoid species, or a mix of several non-native forbs and graminoids. Perennial graminoids include *Eragrostis curvula, Eragrostis lehmanniana, Pennisetum ciliare, Pennisetum setaceum, Sorghum halepense* (mesic sites), and several other species (which have been purposefully seeded to prevent soil erosion or for livestock forage), and/or invasive non-native annual species such as *Bromus rubens, Schismus arabicus*, and *Schismus barbatus*. Numerous other non-native herbaceous species may be present to dominant, including *Brassica tournefortii*. Dense stands of native ruderal species such as *Amaranthus palmeri* or *Solanum elaeagnifolium* resulting from anthropomorphic disturbance are also included in this macrogroup. Invasive non-native shrublands are less common. This macrogroup includes upland desert scrub strongly dominated by invasive native species (*Prosopis glandulosa* and *Prosopis velutina*) with >95% relative cover and >10% absolute shrub cover. *Prosopis* spp.-dominated stands that occur naturally (non-ruderal) in desert lowlands, drainages, washes and riparian areas (bosque) are excluded from this ruderal type. It also includes any desert scrub with an exotic species-dominated understory (>90% relative cover) in the herbaceous layer.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Historically, fire was very rare in the southwestern deserts. The fine fuels needed to carry fire were not present. However, because of recent expansion of non-native grasses such as *Bromus rubens* and *Pennisetum ciliare* into desert scrub, fine fuels have become available and fire frequency, size and severity have increased (Brooks and Matchett 2006). Native desert scrub vegetation, such as *Carnegiea gigantea, Larrea tridentata*, and *Yucca brevifolia*, did not adapt tolerance to fire, is generally killed when burned and does not readily re-establish or does so very slowly for a variety of reasons such as harsh climate (Esque et al. 2004, Brooks et al. 2007, Abella 2009, 2010).

During the last century, the area occupied by this ruderal desert thornscrub group has increased through conversion of desert grasslands as a result of drought, overgrazing and *Prosopis glandulosa* seed dispersion by livestock, and/or decreases in fire frequency (Brown and Archer 1987). It is believed that this group formerly occurred in relatively minor amounts and was largely confined to drainages until cattle distributed seed upland from the bosques into desert grasslands (Brown and Archer 1987, 1989). Shrublands dominated by *Prosopis* spp. have replaced large areas of desert grasslands, especially those formerly dominated by *Bouteloua eriopoda*, in Trans-Pecos Texas, southern New Mexico and southeastern Arizona (York and Dick-Peddie 1969, Hennessy et al. 1983). Studies on the Jornada Experimental Range suggest that combinations of drought, overgrazing by livestock, wind and water erosion, seed dispersal by livestock, fire suppression, shifting dunes, and changes in the seasonal distribution of precipitation have caused this recent, dramatic shift in vegetation physiognomy (Buffington and Herbel 1965, Herbel et al. 1972, Humphrey 1974, McLaughlin and Bowers 1982, Gibbens et al. 1983, Hennessy et al. 1983, Schlesinger et al. 1990, McPherson 1995).

ENVIRONMENT

Environmental Description: This macrogroup contains disturbed desert grasslands and desert scrub that occur in the southwestern U.S. and northern Mexico. The climate is warm, semi-arid with freezing temperatures uncommon or rare during winter months. Most stands occur below approximately 1500 m (5000 feet) in elevation. Generally, these are areas that have been heavily disturbed by heavy equipment, such as old plowed fields, townsites, abandoned mill sites, oil well pads, livestock holding areas and other "waste" places. It is abundant in waste areas often as abandoned pastures that are no longer irrigated, construction areas, roadside margins or other weedy places. It also occurs in areas of former desert scrub that burned because of an unnatural buildup of fine fuels from invasive grasses such as *Bromus rubens, Schismus* spp., or *Pennisetum ciliare*. *Eragrostis curvula*- and *Eragrostis lehmanniana*-dominated stands may be the result of artificial seeding as part of a grassland restoration project. *Soil/substrate/hydrology:* This macrogroup occurs on disturbed dry soils, often in waste places such as abandoned fields, construction lots, pastures that are no longer irrigated, and roadsides. However, it also occurs over vast acres of the semi-arid west, where livestock such as cows and horses have broken soil biotic crust, compacted soil and reduced native plant vigor. The physical environmental settings are similar to both semi-desert grassland and semi-desert shrub-steppe macrogroups.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs in warm deserts and semi-deserts of the southwestern U.S. and northern Mexico, including the Pacific side of Baja California from Tijuana southwards to Bahia Tortugas.

Nations: MX, US

States/Provinces: AZ, CA, MXBC, MXCH, MXSO, NM, TX

USFS Ecoregions (2007) [optional]: 321A:CC, 321B:CC, 322A:CC, 322C:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G677 | North American Warm Desert Ruderal Grassland |
| G819 | North American Warm Desert Ruderal Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | *Amblyopappo pusilli-Mesembryanthemetum crystallini* association | Peinado et al. 2008 | There are similar communities dominated by *Mesembryanthemum* species in California. |
| < | *Brassica nigra* and other mustards (Upland mustards) Semi-natural Stands | Sawyer et al. 2009 | 42.011.00 |
| < | *Brassico tournefortii-Hordeetum leporini association* | Peinado et al. 2008 | Described from Baja California, also exists in San Diego County and probably northward. |
| < | *Brometalia rubenti-tectori* | Rivas-Martínez and Izco 1977 |  |
| < | *Bromus rubens - Schismus (arabicus, barbatus)* (Red brome or Mediterranean grass grasslands) Semi-natural Stands | Sawyer et al. 2009 | 42.024.00 |
| < | *Mesembryanthemion crystallini* | Rivas-Martínez et al. 1993 |  |
| < | *Pennisetum setaceum* (Fountain grass swards) Semi-natural Stands | Sawyer et al. 2009 | 42.085.00 |

AUTHORSHIP

\*Primary Concept Source [if applicable]: K.A. Schulz, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and E.H. Muldavin

Acknowledgments [optional]:

Version Date: 06 Nov 2015

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York, J. C., and W. A. Dick-Peddie. 1969. Vegetation changes in southern New Mexico during the past hundred years. Pages 157-166 in: W. O. McGinnies and B. J. Goldman, editors. Arid lands in perspective. University of Arizona Press, Tucson.

3.B. Cool Semi-Desert Scrub & Grassland

Cool Semi-Desert Scrub & Grassland occurs in dry, cool-temperate climates, at mid-latitudes (35° to 50°N), typically in the interior of continents, and varies from low shrublands to very open grassland and shrub-steppe, including open rocky or sandy semi-desert vegetation.

3.B.1. Cool Semi-Desert Scrub & Grassland

Cool Semi-Desert Scrub & Grassland occurs in dry, cool-temperate climates, at mid-latitudes (35° to 50°N), typically in the interior of continents.

3. Desert & Semi-Desert

3.B.1.Eb. Andean Cool Semi-Desert Cliff, Scree & Other Rock Vegetation

D318. Andean Cool Semi-Desert Cliff, Scree & Other Rock Vegetation

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.B.1.Eb. Cool Semi-Desert Scrub & Grassland (F033)

Elcode: D318

\*Scientific Name: Andean Cool Semi-Desert Cliff, Scree & Other Rock Vegetation Division

\*Common (Translated Scientific) Name: Andean Cool Semi-Desert Cliff, Scree & Other Rock Vegetation Division

\*Colloquial Name: Andean Cool Semi-Desert Cliff, Scree & Other Rock Vegetation

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M862 | Andean Cool Semi-Desert Rock Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.B.1.Eb. Andean Cool Semi-Desert Cliff, Scree & Other Rock Vegetation

M862. Andean Cool Semi-Desert Rock Vegetation

Type Concept Sentence: Saxicolous communities on rocky outcrops and cliffs occurring in the Andes of southern Bolivia and Peru and northern Argentina and Chile, between approximately 1500 and 3100 m elevation, with tropical and Mediterranean xeric climates. Xeromorphic bromeliads and small globular cacti are common growth forms. The composition of these communities can include locally restricted endemics. Dominant genera of the Puna communities are *Abromeitiella, Asplenium, Deuterocohnia, Gymnocalycium, Parodia, Pyrrhocactus, Rebutia*, and *Tillandsia*. In the Mediterranean Andes, diagnostic species are *Adesmia spuma, Astragalus cuyanus, Cajophora coronata, Cynoglossum creticum, Malesherbia mendocina, Nicotiana corymbosa, Phacelia secunda, Poa holciformis, Pozoa coriacea, Senecio glaber, Tropaeolum polyphyllum*, and *Viola atropurpurea*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Eb. Andean Cool Semi-Desert Cliff, Scree & Other Rock Vegetation (D318)

Elcode: M862

\*Scientific Name: Andean Cool Semi-Desert Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Andean Cool Semi-Desert Rock Vegetation Macrogroup

\*Colloquial Name: Andean Cool Semi-Desert Rock Vegetation

\*Type Concept: This macrogroup represents the saxicolous communities on rock outcrops and cliffs occurring in the Andes of southern Bolivia and Peru and northern Argentina and Chile, between approximately 1500 and 3100 m elevation, with tropical and Mediterranean xeric climates. Xeromorphic bromeliads and small globular cacti are common growth forms. The composition of these communities can include locally restricted endemics. Characteristic in the Bolivian Argentinian pre-Puna are *Abromeitiella brevifolia, Abromeitiella lorentziana, Tillandsia gilliesii, Tillandsia pedicellata, Tillandsia bryoides, Deuterocohnia strobilifera, Parodia* spp., *Pyrrhocactus* spp., and *Gymnocalycium* sp., and in the xeric Puna are *Tillandsia virescens, Tillandsia lanuginosa, Tillandsia pusilla, Deuterocohnia strobilifera, Rebutia pygmaea, Asplenium gilliesii, Asplenium peruvianum*, and *Asplenium triphyllum*. Characteristic in the Mediterranean Andes are *Senecio glaber, Nicotiana corymbosa, Cynoglossum creticum, Phacelia secunda, Poa holciformis, Astragalus cuyanus, Astragalus arnottianus, Tropaeolum polyphyllum, Malesherbia mendocina, Cajophora coronata, Adesmia spuma, Pozoa coriacea*, and *Viola atropurpurea*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.B.1.Ed. Patagonian Cool Semi-Desert Scrub & Grassland

D117. Patagonian Cool Semi-Desert Scrub & Grassland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.B.1.Ed. Cool Semi-Desert Scrub & Grassland (F033)

Elcode: D117

\*Scientific Name: Patagonian Cool Semi-Desert Scrub & Grassland Division

\*Common (Translated Scientific) Name: Patagonian Cool Semi-Desert Scrub & Grassland Division

\*Colloquial Name: Patagonian Cool Semi-Desert Scrub & Grassland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M790 | Patagonian Semi-Desert Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.B.1.Ed. Patagonian Cool Semi-Desert Scrub & Grassland

M790. Patagonian Semi-Desert Scrub

Type Concept Sentence: Xeromorphic scrubs of the southern Monte biogeographic region that is transitional to the Patagonia steppes. Dominated by the shrub *Larrea tridentata* and covering extensive plateaus between the Colorado and Negro rivers in Argentina. Associated species include *Chuquiraga hystrix* and *Baccharis darwinii*. To the west, on steep, aridic slopes at around 1000 m elevation accompanying species include *Retanilla patagonica* and *Maihuenia patagonica*. In the plains with a shallow water table and halophilous conditions, *Larrea* is replaced by *Geoffroea decorticans*, which forms large monodominant stands. *Larrea tridentata* steppes continue south into Patagonia, where they occur in cooler climates and on sandy soils.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Ed. Patagonian Cool Semi-Desert Scrub & Grassland (D117)

Elcode: M790

\*Scientific Name: Patagonian Semi-Desert Scrub Macrogroup

\*Common (Translated Scientific) Name: Patagonian Semi-Desert Scrub Macrogroup

\*Colloquial Name: Patagonian Semi-Desert Scrub

\*Type Concept: This macrogroup represents the xeromorphic scrubs of the southern portion of the Monte biogeographic region, transitional to the Patagonia steppes. It is dominated by the shrub *Larrea tridentata (= Larrea divaricata)*, forming open scrubs which cover extensive plateaus between the Colorado and Negro rivers in Argentina, where it is associated with *Chuquiraga hystrix ssp. erinacea* and *Baccharis darwinii*. Towards the west at around 1000 m elevation, the associated species are *Retanilla patagonica* and *Maihuenia patagonica*, in a topography of steep slopes and with very xeric conditions. In the plains or depressions, with a shallow water table and halophilous conditions, *Larrea* is replaced by *Geoffroea decorticans* which forms large, dense, monodominant stands up to 2-2.5 m high. Also in topographic depressions with higher soil moisture but no salinity, associated species are *Baccharis pingraea* and *Melica bonariensis*. South of the Negro River, steppes dominated by *Larrea tridentata (= Larrea divaricata)* continue, but they occur in cooler climatic conditions and on sandy soils with other characteristics. In these conditions, the accompanying species are *Larrea ameghinoi, Tetraglochin caespitosus*, and *Perezia recurvata*, among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.B.1.Eh. Tropical Andean Cool Semi-Desert Scrub & Grassland

D295. Tropical Andean Cool Semi-Desert Scrub & Grassland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.B.1.Eh. Cool Semi-Desert Scrub & Grassland (F033)

Elcode: D295

\*Scientific Name: Tropical Andean Cool Semi-Desert Scrub & Grassland Division

\*Common (Translated Scientific) Name: Tropical Andean Cool Semi-Desert Scrub & Grassland Division

\*Colloquial Name: Tropical Andean Cool Semi-Desert Scrub & Grassland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M787 | Xeric Puna Succulent Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-03-26 | D145 Andean Semi-Desert Division | D145 replaced by D295 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.B.1.Eh. Tropical Andean Cool Semi-Desert Scrub & Grassland

M787. Xeric Puna Succulent Scrub

Type Concept Sentence: Xeromorphic communities of the arid high Andean Puna in Bolivia, northern Chile, northwestern Argentina, and southwestern Peru at elevations of 2900-4000 m. Communities vary depending on elevation, topography, moisture, and soil characteristics, although soils tend to be poor and eroded. Some communities are dominated by the columnar cacti *Trichocereus atacamensis* and accompanied by *Mutisia lanigera* and *Lophopappus tarapacanus*, whereas others are represented by a more diverse set of lifeforms including shrubs, forbs and grasses. Also includes psammophilous open shrublands dominated by endemics such as *Lampaya castellani, Acantholippia salsoloides*, and *Parastrephia lepidophylla*, and accompanied by cacti and grasses.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Eh. Tropical Andean Cool Semi-Desert Scrub & Grassland (D295)

Elcode: M787

\*Scientific Name: Xeric Puna Succulent Scrub Macrogroup

\*Common (Translated Scientific) Name: Xeric Puna Succulent Scrub Macrogroup

\*Colloquial Name: Xeric Puna Succulent Scrub

\*Type Concept: This macrogroup includes several xeromorphic communities of the arid high Andean Puna in western Bolivia, northern Chile, northwestern Argentina, and southwestern Peru in an elevational range from 2900-4000 m on the slopes and on the Andean plateau. Variations in structure and composition depend on altitude, topography, moisture and soil characteristics, though in general soils tend to be poor and eroded. Some communities are dominated by columnar cacti *Trichocereus atacamensis*, accompanied by *Mutisia lanigera* and *Lophopappus tarapacanus*, and others are represented by a more diverse set of shrub species, forbs and grasses, including: *Fabiana ramulosa, Fabiana denudata, Diplostephium meyenii, Oreocereus variispinus, Adesmia verrucosa, Junellia bryoides, Oreocereus leucotrichus, Spergularia fasciculata, Opuntia conoidea*. The macrogroup also includes psammophilous communities in the Andean plateau of Bolivia and Argentina formed by very open shrublands dominated by local endemics such as *Lampaya castellani, Acantholippia salsoloides*, accompanied by cacti and grasses *Opuntia glomerata, Parastrephia lepidophylla, Sporobolus rigens var. atacamensis*, and *Panicum chloroleucum*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2013-03-26 | M379 Dry Puna Scrub & Grassland Macrogroup | M379 replaced by M786 & M787; subsequently M786 archived without successor (CJ 9-13). |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.B.1.Ei. Mediterranean-Southern Andean Cool Semi-Desert Scrub & Grassland

D296. Mediterranean-Southern Andean Cool Semi-Desert Scrub & Grassland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.B.1.Ei. Cool Semi-Desert Scrub & Grassland (F033)

Elcode: D296

\*Scientific Name: Mediterranean-Southern Andean Cool Semi-Desert Scrub & Grassland Division

\*Common (Translated Scientific) Name: Mediterranean-Southern Andean Cool Semi-Desert Scrub & Grassland Division

\*Colloquial Name: Mediterranean-Southern Andean Cool Semi-Desert Scrub & Grassland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M788 | Mediterranean Andean Cool Semi-Desert Scrub & Grassland |
| M789 | Monte Cool Semi-Desert Scrub & Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.B.1.Ei. Mediterranean-Southern Andean Cool Semi-Desert Scrub & Grassland

M788. Mediterranean Andean Cool Semi-Desert Scrub & Grassland

Type Concept Sentence: Plant communities that develop on the semi-arid Andean slopes of central Chile with dry Mediterranean climates in transition to the tropical hyper-arid climate farther north. These are xeromorphic, thorny, open scrubs dominated by Adesmia hystrix, Cristaria andicola, Ephedra breana, Stipa chrysophylla, and *Viviania marifolia*, and usually accompanied by cacti. An equivalent type occurs on the eastern Andean slopes at similar elevations (1800-2800 m) in Mendoza, Argentina, where characteristic species include *Condalia microphylla, Denmoza rhodacantha, Fabiana denudata, Gymnophyton polycephalum, Larrea tridentata, Larrea nitida, Lobivia formosa, Schinus fasciculatus, Stipa sanluisensis, Tephrocactus darwinii*, and *Echinopsis candicans*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Ei. Mediterranean-Southern Andean Cool Semi-Desert Scrub & Grassland (D296)

Elcode: M788

\*Scientific Name: Mediterranean Andean Cool Semi-Desert Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Mediterranean Andean Cool Semi-Desert Scrub & Grassland Macrogroup

\*Colloquial Name: Mediterranean Andean Cool Semi-Desert Scrub & Grassland

\*Type Concept: This macrogroup represents the plant communities that develop on the semi-arid Andean slopes of central Chile with very dry Mediterranean climate in transition to the tropical hyper-arid climate farther north. These are very xeromorphic, thorny, open scrubs dominated by *Adesmia hystrix, Ephedra breana, Stipa chrysophylla, Viviania marifolia*, and *Cristaria andicola*, usually accompanied by cacti species. The equivalent of this type on the eastern Andean slopes occurs at similar elevation (1800-2800 m) in Mendoza, Argentina, with characteristic composition formed by *Larrea tridentata (= Larrea divaricata), Larrea nitida, Fabiana denudata, Schinus fasciculatus, Condalia microphylla, Gymnophyton polycephalum, Stipa sanluisensis, Tephrocactus darwinii, Echinopsis candicans (= Trichocereus candicans), Denmoza rhodacantha*, and *Lobivia formosa*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.B.1.Ei. Mediterranean-Southern Andean Cool Semi-Desert Scrub & Grassland

M789. Monte Cool Semi-Desert Scrub & Grassland

Type Concept Sentence: Scrub and grassland communities of both the upper and lower elevations of the Monte biogeographic region in central to northwestern Argentina that experience a Mediterranean to tropical xeric climate. Upper elevation communities consist of open xeromorphic scrub growing on gravelly soils above 2500 m. Diagnostic species are *Bulnesia schickendantzii, Chuquiraga erinacea, Deuterocohnia* spp., *Gochnatia glutinosa, Larrea* spp., *Plectrocarpa tetracantha, Proustia cuneifolia*, and *Trichocereus* spp. The communities at lower elevations grow in xeric, topographically intricate intermontane valleys with clayish to sandy soils. These are short, semi-open scrubs dominated by *Larrea* spp. ("jarilla") as well as *Bulnesia retama, Cercidium praecox, Geoffroea decorticans*, and *Zuccagnia punctata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Ei. Mediterranean-Southern Andean Cool Semi-Desert Scrub & Grassland (D296)

Elcode: M789

\*Scientific Name: Monte Cool Semi-Desert Scrub & Grassland Macrogroup

\*Common (Translated Scientific) Name: Monte Cool Semi-Desert Scrub & Grassland Macrogroup

\*Colloquial Name: Monte Cool Semi-Desert Scrub & Grassland

\*Type Concept: This macrogroup represents the plant communities of both the upper and lower elevations of the Monte biogeographic region in central to northwestern Argentina growing with a Mediterranean to tropical xeric climate. The former occur on gravelly soils, above 2500 m altitude. These are open xeromorphic scrubs usually accompanied by columnar and other forms of cacti. Diagnostic species are *Plectrocarpa rougesii, Plectrocarpa tetracantha, Bulnesia schickendantzii, Bougainvillea spinosa, Gochnatia glutinosa, Proustia cuneifolia var. mendocina, Larrea tridentata (= Larrea divaricata), Larrea cuneifolia, Chuquiraga erinacea, Trichocereus pasacana, Trichocereus terscheckii, Trichocereus schikendantzii, Opuntia* spp., *Dyckia velazcana, Deuterocohnia schreiteri, Deuterocohnia longipetala, Abromeitiella abstrusa, Pellaea ternifolia, Notholaena squamosa, Notholaena buchtienii*, and *Cheilanthes pruinata*. The communities in lower elevations (from 600-1200 m) grow in xeric intermontane valleys, topographically intricate with clayish to sandy soils. These are short, semi-open scrubs dominated by *Larrea* spp. ("jarilla"); diagnostic species are *Larrea tridentata (= Larrea divaricata), Gochnatia glutinosa, Zuccagnia punctata, Chuquiraga erinacea, Cercidium praecox, Larrea cuneifolia, Bulnesia retama*, and *Geoffroea decorticans*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

3. Desert & Semi-Desert

3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland

D040. Western North American Cool Semi-Desert Scrub & Grassland

Type Concept Sentence: This division encompasses all upland shrub and grassland vegetation within the Western North American Cool Semi-desert region, from south-central Alberta through the Great Basin and western margins of the Great Plains to New Mexico, westward to dry-interior southern British Columbia and south through eastern Oregon and interior California, into the mountains of northwestern Baja California, Mexico. It includes extensive shrublands dominated by *Artemisia tridentata*, ranging from mid to upper slopes and deep to shallow soils, and extensive *Atriplex* shrublands.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 3.B.1.Ne. Cool Semi-Desert Scrub & Grassland (F033)

Elcode: D040

\*Scientific Name: *Artemisia tridentata - Atriplex confertifolia / Hesperostipa comata* Cool Semi-Desert Scrub & Grassland Division

\*Common (Translated Scientific) Name: Big Sagebrush - Shadscale Saltbush /Needle-and-Thread Cool Semi-Desert Scrub & Grassland Division

\*Colloquial Name: Western North American Cool Semi-Desert Scrub & Grassland

\*Type Concept: This division includes a variety of native and non-native shrub and herbaceous vegetation growing naturally within the cool semi-desert climate zone of western North America, centered within the many closed basins and isolated mountain ranges of the Great Basin Province. It includes extensive shrublands dominated by *Artemisia tridentata*, involving four main varieties, each with distinctive ecologies, ranging from mid to upper slopes and deep to shallow soils. It also includes extensive *Atriplex* shrublands, largely restricted to lower slopes and basins. Subshrub *Artemisia* species or similarly low-growing subshrubs dominate on shallow, rocky soil or heavy clay soils and in exposed rocky, subalpine settings. These species include 10 separate taxa of small sagebrush, which segregate geographically and edaphically and are diagnostic at various levels within the division. On the plateaus and mountains of the southern Great Basin, bordering on the southwestern warm deserts, are an array of distinctive shrublands including leaf-succulent *Yucca* and *Nolina* species, and a variety of shrub genera (*Buddleja, Coleogyne, Mortonia, Poliomintha*, etc.) not found elsewhere in this division.

Grasslands are generally patchy within this landscape, locally restricted to sandy or loamy soils and to areas with high fire frequencies. Throughout the northern and western portions of the Great Basin grasslands are predominantly cool-season species (including *Achnatherum, Hesperostipa, Poa, Festuca, Elymus, Pascopyrum*, and *Pseudoroegneria*. In the southern and eastern portions, warm-season grass genera (e.g., *Pleuraphis, Bouteloua, Muhlenbergia*) increase. Intermediate moisture and fire conditions have shrub-steppe, with a combination of *Artemisia* species and mostly perennial grasses and herbs. Early-seral shrublands dominated by *Ericameria* and other short-lived shrubs occur in recovering burns, cleared land, or in intermittently flooded washes. Ruderal grassland dominated and characterized by non-native Eurasian annuals (e.g., *Bromus tectorum, Taeniatherum caput-medusae*) and perennial grasses (e.g., *Agropyron cristatum*) has, through the effects of recent fire, converted many thousands of acres of native shrubland and shrub-steppe in the past 75-100 years.

This division extends south and west of the Great Basin on isolated higher elevation mountains and plateaus surrounded by lower-lying and warmer bioclimates. It also extends eastward and northward to the edge of the Great Plains in eastern Montana, Wyoming, southern Alberta and southeastern British Columbia, Canada, and the western Dakotas. This suite of shrublands and grasslands occupies mountain slopes, plateaus, hills, valleys, and alluvium (including intermittently flooded washes and fans), within a broad range of soil types. The overall climate of the range of this division is in the Koppen bioclimatic zone Mid-latitude Dry Semiarid Steppe (BSk) with smaller areas of Mid-latitude Dry Arid Desert (BWk). Stands range from high plateaus and ridges with skeletal soils to deep well-drained alluvial soils on fans and near washes and heavy clay "self-churning" Vertisols. Some grasslands (now largely extinct) were limited to loess (e.g., Palouse Prairie). Soils harboring stands of certain ruderal vegetation (e.g., *Acroptilon repens, Isatis tinctoria, Sisymbrium* sp.) tend to occur on previously cultivated sites where the soil profile has been disrupted.

\*Diagnostic Characteristics: In general, diagnostic taxa are divided into several main genera. Taller taxa of *Artemisia* (*Artemisia tridentata* and its subspecies *Artemisia tridentata ssp. tridentata, Artemisia tridentata ssp. vaseyana, Artemisia tridentata ssp. wyomingensis*, and *Artemisia tridentata ssp. xericensis*) along with *Purshia tridentata* characterize some parts of the division, as do shorter taxa of *Artemisia* (*Artemisia arbuscula, Artemisia bigelovii, Artemisia nova, Artemisia rothrockii, Artemisia pygmaea, Artemisia rigida*, and others) and midsize shrubby species in the Amaranth family (*Atriplex, Grayia*, etc.). Ruderal non-native grasses and forbs from Eurasia characterize human-disturbed stands.

\*Classification Comments: The relatively high number of macrogroups (7) defined for this division, coupled with the relatively few diagnostic species suggest some splitting has occurred. Within ~Great Basin-Intermountain Dry Shrubland & Grassland Macrogroup (M171)$$, the difference between ~Mojave Mid-Elevation Mixed Desert Scrub Group (G296)$$ and ~Colorado Plateau Blackbrush - Mormon-tea Shrubland Group (G312)$$ is poorly defined, with separate groups each having alliances defined by the same diagnostics (e.g., *Coleogyne, Ephedra viridis*). Floristic similarities across the upper elevation Mojave Desert shrublands and those of the Colorado Plateau have been discussed previously (West 1993d). ~Intermountain Semi-Desert Steppe & Shrubland Group (G310)$$ is floristically similar to ~Intermountain Sparsely Vegetated Dune Scrub & Grassland Group (G775)$$, since both contain diagnostics such as *Ericameria nauseosa*. ~Great Basin-Intermountain Xeric-Riparian Scrub Macrogroup (M095)$$ is poorly described and contains elements of ~Great Basin Saltbush Scrub Macrogroup (M093)$$ (*Atriplex canescens*), and ~Great Basin-Intermountain Dry Shrubland & Grassland Macrogroup (M171)$$ (e.g., *Ericameria nauseosa*). It is proposed that M095 be merged into M171, and G559 into G310 (M. Reid pers comm. 2016). ~Great Basin-Intermountain Xeric-Riparian Scrub Macrogroup (M095)$$, if not found to contain any other diagnostic floristic elements, should be dissolved. Similarly, ~Intermountain Basins Cliff, Scree & Badland Sparse Vegetation Macrogroup (M118)$$ contains very few diagnostics as described and could possibly be dissolved. For example, *Atriplex canescens, Ephedra* spp., *Ericameria* spp., and *Pseudoroegneria* already characterize other alliances in other macrogroups in the division. Further consideration should be given to removing these and other alliances (e.g., ~*Pinus ponderosa - Cercocarpus intricatus* Bedrock Cliff & Canyon Wooded Scrub Alliance (A4051)$$) and placing them within 1.B.2.Nb ~Rocky Mountain Forest & Woodland Division (D194)$$. Some alliances (e.g., ~*Eriogonum ovalifolium - Fallugia paradoxa - Andropogon hallii* Lava & Cinder Sparse Vegetation Alliance (A4053)$$) seem poorly defined and need more review regarding their placement in this division (e.g., *Eriogonum ovalifolium* most commonly forms stands in subalpine settings), and perhaps overlap in concept with members of 4.B.1.Nb ~Western North American Alpine Tundra Division (D043)$$. A single alliance (~*Juniperus californica* Mojave Scrub Alliance (A0502)$$) within ~Great Basin-Intermountain Dry Shrubland & Grassland Macrogroup (M171)$$ may overlap in concept with types in 1.B.2.Nc ~Western North American Pinyon - Juniper Woodland & Scrub Division (D010)$$, but probably has sufficient Mojavean floristics to remain here.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D327 | Californian Scrub & Grassland |  |
| D031 | Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland | Within D040, some of the mesic associations in ~*Artemisia cana ssp. bolanderi - Artemisia cana ssp. viscidula* Steppe & Shrubland Alliance (A3200)$$, in G304/M169) verge on moist meadow settings that are part of D031. |
| D036 | North American Western Interior Brackish Marsh, Playa & Shrubland | There is overlap with D036 and ~Great Basin Saltbush Scrub Macrogroup (M093)$$ in D040. However, there are generally very few phreatophytic (groundwater-dependent) species present in M093. Certain alliances, such as ~*Chrysothamnus albidus* Shrubland Alliance (A0834)$$ (currently within M171) are close ecologically to D036, and with further investigation, may be found to best fit there. |
| D039 | North American Warm Desert Scrub & Grassland | overlaps narrowly at the southern extremes as higher mountains with D040 and lower fans and slopes of D039 interfinger, but is easily distinguished due to presence of strong diagnostics such as *Larrea tridentata, Encelia farinosa*, etc. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The vegetation contains both open to dense shrublands dominated by largely pubescent gray-green evergreen shrubs that form a canopy of from 0.5 m to 4 m in height and herbaceous species, including grasses and forbs, may be sparse or dense with or without a shrub canopy. Trees are widely scattered or absent in drier stands or early- to mid-seral stands, but in the case of *Juniperus* may increase in cover in stands with long fire-return intervals and relatively high annual precipitation. In rocky areas, shrublands tend to be clumped and sparse with higher proportion of small-leaved or scale-leaved species, some with photosynthetic branches (*Ericameria, Ephedra*). Grasslands may be dominated by midsize (*Pascopyrum, Pseudoroegneria*), or small (*Poa, Festuca* ) bunchgrasses, or by annuals which produce considerable residual dry material (e.g., *Bromus, Taeniatherum, Ventenata*).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Taller taxa of *Artemisia* (*Artemisia tridentata* and its subspecies *Artemisia tridentata ssp. tridentata, Artemisia tridentata ssp. vaseyana, Artemisia tridentata ssp. wyomingensis*, and *Artemisia tridentata ssp. xericensis*) along with *Artemisia tripartita* and *Purshia tridentata* characterize some parts of the division, as do shorter taxa of *Artemisia* (*Artemisia arbuscula, Artemisia bigelovii, Artemisia nova*, and others) and midsize shrubby species in the Amaranth family (*Atriplex, Grayia*, etc.). Species of *Ephedra, Ericameria, Chrysothamnus*, and *Eriogonum* commonly occur.

The subshrub *Artemisia* species or similarly low-growing subshrubs dominate on shallow, rocky soil or heavy clay soils and in exposed rocky, subalpine settings (Tisdale 1994a, 1994b). These taxa include 10 separate taxa of low or small *Artemisia*, which segregate geographically and edaphically, including *Artemisia arbuscula, Artemisia bigelovii, Artemisia nova, Artemisia rothrockii, Artemisia pygmaea, Artemisia rigida, Artemisia pedatifida, Artemisia frigida*, and non-wetland *Artemisia cana* communities. On the plateaus and mountains of the southern Great Basin bordering on the southwestern warm deserts are an array of distinctive shrublands, including leaf-succulent *Yucca* and *Nolina* species, and a variety of shrub genera (*Buddleja, Coleogyne, Mortonia, Poliomintha*, etc.) not found elsewhere in this division (West 1983d).

Grasslands are generally patchy within this landscape, locally restricted to sandy or loamy soils and to areas with high fire frequencies. Throughout the northern and western portions of the Great Basin grasslands are predominantly cool-season species, including *Achnatherum (= Stipa), Hesperostipa, Poa, Festuca, Elymus, Pascopyrum*, and *Pseudoroegneria* (Tisdale 1994c). In the southern and eastern portions, warm-season grass genera (e.g., *Pleuraphis, Bouteloua, Muhlenbergia*) increase. Intermediate moisture and fire conditions have shrub-steppe, with a combination of *Artemisia* species and mostly perennial grasses and herbs (West 1983c, Young et al. 2007b). Early-seral shrublands dominated by *Ericameria* and other short-lived shrubs occur in recovering burns, cleared land, or in intermittently flooded washes. Ruderal grassland dominated and characterized by non-native Eurasian annuals (e.g., *Bromus tectorum, Taeniatherum caput-medusae*) and perennial grasses (e.g., *Agropyron cristatum*) has, through the effects of recent fire, converted many thousands of acres of native shrubland and shrub-steppe in the past 75-100 years (Johnson 1986d, Updike et al. 1990, Whisenant 1990, Petersen 2003).

Ruderal non-native grasses and forbs from Eurasia characterize human-disturbed stands

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The current dynamics within this division are products of both natural and anthropogenic disturbance. Natural fire frequencies in the division are variable. Summer thunderstorms generate thousands of lightning strikes annually. Despite the sensitivity of most of the dominant shrub species to fire (Callison et al. 1985, Updike et al. 1990), historically fire did not burn extensive areas of Great Basin upland scrub due to lower fuel cover and natural rocky fuel breaks. Fire frequently burned more continuous stands of grasslands in the Palouse Prairie of eastern Washington (now largely converted to agriculture) and on the borders of the shortgrass prairie in eastern Montana, Wyoming, and north-central Colorado. Stands of *Artemisia arbuscula* (low sagebrush) in mountainous areas and scattered rocky upland shrublands were subject to small infrequent fires and local effects of drought, rockfall, and avalanches. The extensive basin margin stands of *Atriplex canescens* (saltbush) were affected by drought and disease and limited fire (due to lack of herbaceous fuels). Currently, with the advent of extensive invasive species, such as *Bromus tectorum, Ventenata dubia, Taeniatherum caput-medusae*, and a variety of taller annual forbs such as *Sisymbrium* sp., *Descurainia* sp., *Centaurea* sp., and *Salsola tragus*, fires carry more continuously through many of the shrublands of this division, causing widespread type-conversion (Johnson 1986, Updike et al. 1990, Whisenant 1990, Petersen 2003). Grazing intensity in some areas has increased flashy annual herb cover relative to shrub cover. Subtle combinations of fire suppression and climatic shifts to slightly moister conditions in part of the region are responsible for expansion of conifers such as *Juniperus occidentalis* (Miller et al. 2008) or *Abies concolor* (Vale 1975) into parts of this division.

ENVIRONMENT

Environmental Description: This division includes extensive shrublands dominated by *Artemisia tridentata*, involving four main varieties, each with distinctive ecologies, ranging from mid- to upper slopes and deep to shallow soils (Meyer and Monsen 1992, McArthur 1994). It also includes extensive *Atriplex* shrublands, largely restricted to lower slopes and basins (Billings 1949).

*Climate:* The overall climate of the range of this division is in the Köppen bioclimatic zone Mid-latitude Dry Semiarid Steppe (BSk) with smaller areas of Mid-latitude Dry Arid Desert (BWk)

*Soil/substrate/hydrology:* With few exceptions, vegetation in this division tends to avoid regularly flooded or saturated low-lying landscapes (Ganskopp 1986). Stands range from high plateaus and ridges with skeletal soils to deep well-drained alluvial soils on fans and near washes and heavy clay "self-churning" Vertisols. Certain vegetation, such as the *Artemisia arbuscula ssp. longiloba* alliance, is restricted to heavy clay soils derived from volcanic rock. The *Atriplex corrugata* alliance is limited to sites with shale-derived clay soils. Some were limited to loess (e.g., Palouse Prairie, now largely eliminated by human conversion to agriculture). Soils harboring stands of certain ruderal vegetation (e.g., *Acroptilon repens, Isatis tinctoria, Sisymbrium* sp.) tend to occur on previously cultivated sites where the soil profile has been disrupted.

*Biogeography:* The genus *Artemisia* is well represented with 29 species largely endemic to the Great Basin Province and within the range of the division, about 42% of all North American *Artemisia* (fide BONAP 2010). *Atriplex* is represented by 21 species (23% of the North American total *Atriplex* species). *Ericameria* is represented by 7 or 8 species (about 20% of the genus in the continent). Several genera of rosaceous shrubs (*Coleogyne, Fallugia, Purshia*) are largely endemic to the vegetation in this division. Other widespread cool semi-desert shrub genera found in Eurasia include *Ephedra* and *Krascheninnikovia*, and grass genera such as *Elymus, Poa*, and *Festuca*.

DISTRIBUTION

\*Geographic Range: This division occurs from south-central Alberta, south through the Great Basin of western North America to the plateaus and mountains of New Mexico and westward to dry-interior southeastern British Columbia and the western Dakotas (West 1988), and south through eastern Oregon and interior California, into the mountains of northwestern Baja California, Mexico. Throughout most of the northern and central range this vegetation occurs below 1800 m, but in the southern portion it may exist in subalpine settings of over 3000 m.

Nations: CA, MX, US

States/Provinces: AB, AZ, BC, CA, CO, ID, MT, MXBC, ND, NM, NV, OR, SD?, UT, WA, WY

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M171 | Great Basin-Intermountain Dry Shrubland & Grassland |
| M170 | Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland |
| M169 | Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland |
| M095 | Great Basin-Intermountain Xeric-Riparian Scrub |
| M093 | Great Basin Saltbush Scrub |
| M118 | Intermountain Basins Cliff, Scree & Badland Sparse Vegetation |
| M499 | Western North American Cool Semi-Desert Ruderal Scrub & Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Great Basin desertscrub | Turner 1982c | is equivalent except for the inclusion of *Sarcobatus vermiculatus*. |
| ? | Intermountain Valleys and Lower Mountain Slopes | West and Young 2000 |  |
| = | North American Temperate Desert and Semi-desert | West 1983f | See also treatments within this reference. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: N.E. West (1983f)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: T. Keeler-Wolf and M.S. Reid

Acknowledgments [optional]:

Version Date: 06 Jan 2016

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3. Desert & Semi-Desert

3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland

M171. Great Basin-Intermountain Dry Shrubland & Grassland

Type Concept Sentence: This diverse semi-arid macrogroup is found throughout the Intermountain West, including mid-elevation sites in eastern and central Mojave Desert, the Great Basin, Colorado Plateau, Columbia Plateau, and lower elevation sites in the central Rocky Mountains extending east across Wyoming Basins into the western Great Plains. It can occur as open shrubland, dwarf-shrub, shrub herbaceous, or grassland communities. Characteristic species include shrubs *Chrysothamnus viscidiflorus, Coleogyne ramosissima, Ephedra* spp., *Ericameria nauseosa, Gutierrezia sarothrae, Krascheninnikovia lanata*, and dry grasses such as *Achnatherum hymenoides, Achnatherum lettermanii, Aristida purpurea, Bouteloua gracilis, Hesperostipa comata, Leymus salinus ssp. salinus, Muhlenbergia pungens, Pleuraphis jamesii, Poa fendleriana, Poa secunda, Pseudoroegneria spicata, Sporobolus cryptandrus*, and *Sporobolus airoides*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland (D040)

Elcode: M171

\*Scientific Name: *Chrysothamnus viscidiflorus - Coleogyne ramosissima / Achnatherum hymenoides* Dry Shrubland & Grassland Macrogroup

\*Common (Translated Scientific) Name: Yellow Rabbitbrush - Blackbrush / Indian Ricegrass Dry Shrubland & Grassland Macrogroup

\*Colloquial Name: Great Basin-Intermountain Dry Shrubland & Grassland

\*Type Concept: This macrogroup is found throughout the Intermountain West, including mid-elevation sites in eastern and central Mojave Desert, the Great Basin, Colorado Plateau, Columbia Plateau, and lower elevation sites in the central Rocky Mountains extending east across Wyoming Basins into the western Great Plains. Stands can occur as open shrubland, dwarf-shrub, shrub herbaceous or grassland communities. Characteristic shrubs include *Chrysothamnus viscidiflorus, Coleogyne ramosissima, Ephedra torreyana, Ephedra viridis, Ericameria nauseosa, Ericameria parryi, Gutierrezia sarothrae*, and *Krascheninnikovia lanata*. Less frequent diagnostic shrubs include *Artemisia filifolia, Chrysothamnus albidus, Ephedra cutleri, Ericameria teretifolia, Glossopetalon spinescens var. aridum, Opuntia* spp., *Parryella filifolia, Poliomintha incana, Psorothamnus fremontii, Purshia stansburiana, Quercus havardii var. tuckeri, Tetradymia canescens, Tetradymia tetrameres*, and *Vanclevea stylosa*. In cooler canyon and foothill sites, deciduous shrubs such as *Holodiscus discolor, Physocarpus malvaceus, Rhus glabra, Ribes* spp., and *Symphoricarpos* spp. maybe present. Additional shrubs characteristic of mid-elevation Mojave Desert sites are *Eriogonum fasciculatum, Ephedra californica, Ephedra nevadensis, Eriogonum corymbosum, Grayia spinosa, Lycium andersonii, Menodora spinescens, Nolina bigelovii, Nolina microcarpa, Nolina parryi, Cylindropuntia acanthocarpa, Purshia glandulosa, Purshia stansburiana, Salazaria mexicana, Thamnosma montana, Yucca brevifolia*, or *Yucca schidigera*. Wide-ranging shrubs *Atriplex canescens, Artemisia tridentata*, and *Sarcobatus vermiculatus* may be present, but do not dominate, as they are diagnostic of other macrogroups. The herbaceous layer is sparse to moderately dense and is characterized by perennial graminoids *Achnatherum hymenoides, Achnatherum lettermanii, Aristida purpurea, Bouteloua gracilis, Hesperostipa comata, Leymus salinus ssp. salinus, Muhlenbergia pungens, Pleuraphis jamesii, Poa fendleriana, Poa secunda, Pseudoroegneria spicata, Sporobolus airoides*, and *Sporobolus cryptandrus*. Forb cover is sparse but can be relatively diverse. These communities occur on a variety of landforms. Shrublands are common on windswept mesas, canyons, benchlands, colluvial slopes, alluvial fans and flats, broad basins and sandy plains. Grassland and steppe occur in both lowland and upland areas and may occupy swales, playas, mesatops, plateau parks, canyon bottoms and slopes, foothills, alluvial terraces, and plains. Sites range from gentle to steep slopes on all aspects. Soils are variable but are generally shallow, calcareous, and range from sandy to finer-textured (clays to silt-loams) that are often derived from limestone, sandstone or shale.

\*Diagnostic Characteristics: This diverse semi-arid macrogroup occurs as open shrub, dwarf-shrub, shrub herbaceous, grassland, or sparse vegetation communities (on sand deposits). Stands typically range from 5-50% total vegetation cover. Rock outcrop, shale badlands and deep sand sites are typically sparse. If present, the shrub layer is characterized by wide-ranging diagnostic shrubs *Chrysothamnus viscidiflorus, Coleogyne ramosissima, Ephedra torreyana, Ephedra viridis, Ericameria nauseosa, Ericameria parryi, Gutierrezia sarothrae*, and *Krascheninnikovia lanata*. Less frequent diagnostic shrubs include *Chrysothamnus albidus, Ericameria teretifolia, Glossopetalon spinescens var. aridum, Opuntia* spp., *Purshia stansburiana*, and *Tetradymia canescens*. Additional diagnostic shrubs characteristic of sand deposits are *Artemisia filifolia, Ephedra cutleri, Eriogonum leptocladon, Parryella filifolia, Poliomintha incana, Psorothamnus fremontii, Quercus havardii var. tuckeri, Tetradymia tetrameres*, or *Vanclevea stylosa*. Other shrubs characteristic of mid-elevation Mojave Desert sites are *Eriogonum fasciculatum, Ephedra californica, Ephedra nevadensis, Eriogonum corymbosum, Grayia spinosa, Lycium andersonii, Menodora spinescens, Nolina bigelovii, Nolina microcarpa, Nolina parryi, Cylindropuntia acanthocarpa, Purshia glandulosa, Purshia stansburiana, Salazaria mexicana, Thamnosma montana, Yucca brevifolia*, or *Yucca schidigera*. The herbaceous layer is sparse to moderately dense and is characterized by perennial graminoids *Achnatherum hymenoides, Achnatherum lettermanii, Aristida purpurea, Bouteloua gracilis, Hesperostipa comata, Leymus salinus ssp. salinus, Muhlenbergia pungens, Pleuraphis jamesii, Poa fendleriana, Poa secunda, Pseudoroegneria spicata, Sporobolus airoides*, and *Sporobolus cryptandrus*. Forb cover is sparse but can be relatively diverse.

\*Classification Comments: This macrogroup encompasses a somewhat broad range of semi-desert shrublands in the Intermountain West. Many of these communities are somewhat disturbance-maintained, early-seral types. Additional data and analysis are needed to clarify the associations that should be placed here. Shrub communities occurring over talus included in this macrogroup are part of a continuum and can be highly variable, and some dwarf-shrub communities can technically be defined as herbaceous types. It's possible that ~Colorado Plateau Blackbrush - Mormon-tea Shrubland Group (G312)$$ could be merged in this macrogroup with ~Mojave Mid-Elevation Mixed Desert Scrub Group (G296)$$, as they both are found in higher elevations that are wetter and cooler and they overlap significantly in floristics.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M048 | Central Rocky Mountain Montane-Foothill Grassland & Shrubland | is a similar western macrogroup that includes higher elevation, more relatively mesic grasslands and shrublands. There is some species overlap in foothill zones. |
| M088 | Mojave-Sonoran Semi-Desert Scrub |  |
| M118 | Intermountain Basins Cliff, Scree & Badland Sparse Vegetation |  |
| M093 | Great Basin Saltbush Scrub |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is variable, being composed of grasslands, shrublands and steppe. The shrub layer, if present, is open to moderately dense and composed of evergreen, microphyllous semi-desert scrubs and/or cold-deciduous, broad-leaved shrubs with succulents and dwarf-shrubs. Herbaceous species may form a sparse to moderately dense layer composed of perennial graminoids. Forb cover is sparse but can be relatively diverse.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Vegetation in this semi-arid macrogroup is highly variable, ranging from open to dense shrublands, grasslands and steppe, including sparse vegetation on sand deposits. High-frequency dominant shrubs that characterize this macrogroup are *Chrysothamnus viscidiflorus, Coleogyne ramosissima, Ephedra torreyana, Ephedra viridis, Ericameria nauseosa, Ericameria parryi, Gutierrezia sarothrae, Krascheninnikovia lanata*, and *Poliomintha incana*. Less frequent but sometimes dominant shrubs include *Chrysothamnus albidus, Ericameria teretifolia, Glossopetalon spinescens var. aridum, Opuntia fragilis, Opuntia polyacantha, Opuntia phaeacantha, Purshia stansburiana*, and *Tetradymia canescens*. Sand communities are characterized by *Artemisia filifolia, Ephedra cutleri, Ephedra torreyana, Ephedra viridis, Eriogonum leptocladon, Parryella filifolia, Poliomintha incana, Psorothamnus fremontii, Quercus havardii var. tuckeri, Tetradymia tetrameres*, or *Vanclevea stylosa*. In cooler canyon and foothill sites, deciduous shrubs such as *Holodiscus discolor, Physocarpus malvaceus, Rhus glabra, Ribes* spp., and *Symphoricarpos* spp. maybe present. Shrubs diagnostic of other macrogroups such as *Atriplex canescens, Artemisia tridentata*, shrubby *Juniperus osteosperma*, and *Sarcobatus vermiculatus* may be present to codominant. In the southern Great Basin and mid-elevation sites in the Mojave Desert, *Yucca brevifolia* and several other desert shrubs, such as *Eriogonum fasciculatum, Ephedra californica, Ephedra nevadensis, Eriogonum corymbosum, Grayia spinosa, Lycium andersonii, Menodora spinescens, Nolina bigelovii, Nolina microcarpa, Nolina parryi, Cylindropuntia acanthocarpa (= Opuntia acanthocarpa), Purshia glandulosa, Purshia stansburiana, Salazaria mexicana, Thamnosma montana*, or *Yucca schidigera*, may also be present. Other associated shrubs include *Eriogonum* spp., *Fallugia paradoxa, Grayia spinosa, Isocoma drummondii*, and *Lycium pallidum*. The herbaceous layer is sparse to moderately dense and composed of drought-resistant perennial graminoids such as *Achnatherum lettermanii, Aristida purpurea, Bouteloua gracilis, Hesperostipa comata, Leymus salinus ssp. salinus, Pleuraphis jamesii, Poa fendleriana, Poa secunda, Pseudoroegneria spicata*, and *Sporobolus airoides*. On sandy sites *Achnatherum hymenoides, Leymus flavescens, Muhlenbergia pungens, Psoralidium lanceolatum* and *Sporobolus cryptandrus* are prominent. *Festuca idahoensis* may codominate in cooler canyon slopes and higher elevation stands. Forb cover is sparse but can be relatively diverse. Associated forbs include *Astragalus purshii, Balsamorhiza sagittata, Calochortus macrocarpus, Chamaesyce* spp., *Erigeron* spp., *Hymenopappus filifolius, Lupinus pusillus, Machaeranthera canescens, Phlox hoodii, Sphaeralcea coccinea, Sphaeralcea munroana, Vicia americana*, and species of *Antennaria, Astragalus, Cryptantha, Eriogonum, Gilia*, and *Lappula*. Annuals may be seasonally present to abundant depending on precipitation and disturbance. Cryptogams are important in some stands with up to 40% ground cover on sites in the Colorado Plateau. Exotic species such as *Bassia scoparia (= Kochia scoparia), Bromus tectorum, Draba verna, Lactuca serriola, Poa pratensis, Salsola tragus, Sisymbrium altissimum*, and *Tragopogon dubius* are present in many of these stands.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Fire dynamics are variable depending on dominant species. Many grasslands and shrublands are fire-adapted, while others, such as blackbrush, are fire-intolerant (Loope and West 1979). Following fires, these communities are often colonized by non-native grasses, which create abundant fine fuels that facilitate recurrent fires and delay shrub regeneration (Reid et al. 1999).

In shallow regolith situations, secondary succession, in the sense of site preparation by seral plants, may not occur at all (Loope and West 1979). When this vegetation (especially *Artemisia filifolia*-dominated stands) occurs on deeper loessal soils, some consider this shrub invasion of semi-desert shrub-steppe (Loope 1977).

ENVIRONMENT

Environmental Description: This macrogroup is found throughout the Intermountain West from the Great Basin and Colorado Plateau and Wyoming Basins north to the Columbia Plateau, central Rocky Mountains and extends east into the western Great Plains. Elevations ranging from 90 m along the Columbia River up to 2500 m in high plateaus and mountains.

*Climate:* The climate is semi-arid and is generally hot in summers and cold in winters with low annual precipitation, ranging from 4-40 cm and high inter-annual variation, although annual precipitation in canyon bottoms can be <10 cm. Temperatures are continental with large annual and diurnal variations. In the southern and eastern range extent, significant portion of the precipitation falls in July through October during the summer monsoon storms, with the rest falling as snow during the winter and early spring months. In the northern and western extent, much of the precipitation falls as snow in winter and spring, and summer drought is common.

*Physiography/landform:* Stands occur on a variety of landforms. Shrublands are common on windswept mesas, canyons, benchlands, colluvial slopes, alluvial fans and flats, broad basins and plains. Grassland and steppe occur in both lowland and upland areas and may occupy swales, playas, mesatops, plateau parks, canyon bottoms and slopes, foothills, alluvial terraces, valleys, and plains. Sites range from gentle to steep slopes on all aspects.

*Soil/substrate/hydrology:* Soils are variable but are generally shallow, calcareous, and range from sandy to finer-textured (clays to silt-loams) that are often derived from limestone, sandstone or shale. Some sites can be flat, poorly drained and intermittently flooded with a shallow or perched water table often within 1 m depth (West 1983e). Other sites are alluvial or eolian sand or deposits including extensive sandy plains and stabilized sandsheets that may form small hummocks or small coppice dunes. Eolian processes are evident on these sites, such as pediceled plants, occasional blowouts or small dunes, but the generally higher vegetative cover and less prominent geomorphic features distinguish this macrogroup from active and stabilized dune complexes. Dark-colored cryptogamic soil crusts composed of lichens, mosses, fungi, and algae are often present in fairly undisturbed areas. Sandy soils may have more cryptogamic crusts than clayish or silty soil surfaces. These cryptogams tend to increase the stability of the highly erodible sandy soils during torrential summer rains and heavy wind storms (Kleiner and Harper 1977).

DISTRIBUTION

\*Geographic Range: This broadly defined semi-arid grassland, shrubland and steppe macrogroup occurs throughout the intermountain western U.S. from eastern Washington, southern Idaho and southwestern and south-central Montana south to southeastern California, northern Arizona and New Mexico, including mid-elevation sites in eastern and central Mojave Desert, the Columbia Plateau, Great Basin, Colorado Plateau, central Rocky Mountains, and Wyoming Basins region, extending into the western Great Plains.

Nations: CA?, MX?, US

States/Provinces: AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]: 313A:CC, 313B:CC, 313C:CC, 313D:CC, 315A:CC, 315B:CC, 315H:CC, 321A:CC, 322A:CC, 331A:CC, 331B:CC, 331H:CC, 331I:CC, 331J:CC, 341A:CC, 341B:CC, 341C:CC, 341D:CC, 341E:CC, 341F:CC, 341G:CC, 342B:CC, 342C:CC, 342D:CC, 342E:CC, 342F:CC, 342G:CC, 342H:CC, 342I:CC, 342J:CC, M242C:CC, M242D:CP, M261E:CC, M261G:CC, M313A:CC, M313B:CC, M331A:CC, M331B:CC, M331D:CC, M331E:CC, M331F:CC, M331G:CC, M331H:CC, M331I:CC, M331J:CC, M332A:CC, M332E:CP, M332F:CC, M332G:CC, M333A:CC, M333B:C?, M333D:C?, M341A:CC, M341B:CC, M341C:CC, M341D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G296 | Mojave Mid-Elevation Mixed Desert Scrub |
| G312 | Colorado Plateau Blackbrush - Mormon-tea Shrubland |
| G311 | Intermountain Semi-Desert Grassland |
| G310 | Intermountain Semi-Desert Steppe & Shrubland |
| G775 | Intermountain Sparsely Vegetated Dune Scrub & Grassland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Blackbush (212) | Shiflet 1994 |  |
| >< | Bluebunch Wheatgrass (101) | Shiflet 1994 |  |
| < | Colorado Plateau - Mohavian Blackbush Semi-Desert | West 1983d |  |
| < | Grama - Galleta (502) | Shiflet 1994 |  |
| >< | Idaho Fescue (102) | Shiflet 1994 |  |
| < | Mohave Desertscrub, Blackbrush Series - 153.12 | Brown et al. 1979 |  |
| < | Mohave Desertscrub, Blackbrush Series, Blackbrush Series, *Coleogyne ramosissima-Yucca* spp. Association - 153.122 | Brown et al. 1979 |  |
| < | Mohave Desertscrub, Blackbrush Series, Blackbrush Series, *Coleogyne ramosissima* Association - 153.121 | Brown et al. 1979 |  |
| < | Mohave Desertscrub, Joshuatree Series - 153.15 | Brown et al. 1979 |  |
| < | Mohave Desertscrub, Joshuatree Series, *Yucca brevifolia-Acamptopappus sphaerocephalus-Larrea divaricata*-Mixed Scrub Association - 153.151 | Brown et al. 1979 |  |
| < | Mohave Desertscrub, Joshuatree Series, *Yucca brevifolia-Coleogyne ramosissima* Association - 153.152 | Brown et al. 1979 |  |
| < | Mohave Desertscrub, Joshuatree Series, *Yucca brevifolia-Larrea divaricata* Association - 153.153 | Brown et al. 1979 |  |
| < | Southwestern Utah Galleta-Threeawn Shrub Steppe. | West 1983e |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and P. Comer

Acknowledgments [optional]:

Version Date: 26 Jan 2016

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3. Desert & Semi-Desert

3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland

M170. Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland

Type Concept Sentence: This semi-arid intermountain western U.S. macrogroup is characterized by short sagebrush taxa that form an open to moderately dense dwarf-shrub layer on shallow, rocky, calcareous or alkaline soils. Stands are dominated by one of several diagnostic *Artemisia* taxa depending on location and habitat, including *Artemisia arbuscula ssp. arbuscula, Artemisia arbuscula ssp. longiloba, Artemisia arbuscula ssp. longicaulis, Artemisia arbuscula ssp. thermopola, Artemisia bigelovii, Artemisia frigida, Artemisia nova, Artemisia rigida*, or *Artemisia tripartita ssp. rupicola*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland (D040)

Elcode: M170

\*Scientific Name: *Artemisia arbuscula - Artemisia nova - Artemisia rigida* Steppe & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Little Sagebrush - Black Sagebrush - Scabland Sagebrush Steppe & Shrubland Macrogroup

\*Colloquial Name: Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland

\*Type Concept: This broadly defined semi-arid dwarf-shrubland and steppe occurs throughout much of the intermountain western U.S. The vegetation is characterized by an open to moderately dense shrub or dwarf-shrub layer with a sparse to moderately dense herbaceous layer. Several different short sagebrush taxa may dominate depending on location and habitat. *Artemisia nova* is most widespread, occurring throughout most of the region on mid- to low-elevation, gravelly, calcareous soils. *Artemisia arbuscula ssp. arbuscula* occurs on low- to high-elevation sites often on shallow, fine-textured soils with a dense clay layer that impedes drainage in spring. *Artemisia arbuscula ssp. longiloba* is widespread in the Columbia Basin, Great Basin, southwestern Montana, southwestern Wyoming, and badlands in the western Great Plains. It occurs on shallow, alkaline, calcareous soils derived from shale. *Artemisia bigelovii* occurs throughout much of the Colorado Plateau and extends across northern New Mexico into southeastern Colorado on shallow soils on limestone hills and shale outcrops. *Artemisia rigida* is restricted to the Columbia Plateau scablands with shallow, poorly drained, lithic soil over fractured basalt that is often saturated in winter, but typically dries out completely to bedrock by midsummer. These stands are typically codominated by diagnostic *Eriogonum* species: *Eriogonum compositum, Eriogonum douglasii, Eriogonum microthecum, Eriogonum niveum, Eriogonum sphaerocephalum, Eriogonum strictum*, and/or *Eriogonum thymoides*. These same *Eriogonum* species may be dominant without *Artemisia rigida*. Another local diagnostic/dominant species is *Artemisia papposa* that is restricted to poorly drained, mesic sites in southern Idaho and southeastern Oregon. Several other more restricted taxa include *Artemisia tripartita ssp. rupicola, Artemisia arbuscula ssp. longicaulis, Artemisia arbuscula ssp. thermopola*, and *Artemisia frigida*. Other shrub associates may be present such as *Artemisia tridentata ssp. wyomingensis, Artemisia tridentata ssp. vaseyana, Ephedra torreyana, Ephedra viridis, Grayia spinosa*, or *Purshia tridentata*, depending on habitat. The herbaceous layer, if present, ranges from sparse cushion plants, such as *Arenaria hookeri, Eriogonum brevicaule*, and *Phlox hoodii*, to moderate to dense cover of perennial grasses. Characteristic grasses include *Achnatherum hymenoides, Bouteloua gracilis, Danthonia unispicata, Elymus elymoides, Elymus lanceolatus, Festuca idahoensis, Hesperostipa comata, Pascopyrum smithii, Pleuraphis jamesii, Poa fendleriana, Poa secunda*, and *Pseudoroegneria spicata*. Scattered forbs may include species of *Allium, Antennaria, Balsamorhiza, Lomatium, Phlox*, and *Sedum*. Some stands have significant biological crust formation on the soil surface. Sites are generally xeric and may be wind-blown ridges and benches, gravelly alluvial fans, hilltops, canyons, gravelly draws, and dry flats. Most stands occur from 1000 to 3000 m elevation with some extending up to 3800 m in subalpine and alpine habitats of the Sierra Nevada. Substrates are variable, but are typically alluvium derived from limestone, shale, basalt, rhyolite or volcanics.

\*Diagnostic Characteristics: This semi-arid macrogroup of the Intermountain West is characterized by an open to moderately dense dwarf-shrub layer with >10% shrub cover and a sparse to dense herbaceous layer. Several different taxa of sagebrush are strong diagnostic species and vary depending on geographic location and by habitat, including *Artemisia arbuscula ssp. arbuscula, Artemisia arbuscula ssp. longicaulis, Artemisia arbuscula ssp. longiloba, Artemisia arbuscula ssp. thermopola, Artemisia bigelovii, Artemisia frigida, Artemisia nova, Artemisia rigida*, and *Artemisia tripartita ssp. rupicola*. Associated herbaceous taxa are semi-desert perennial grasses and forbs. Stands characterized by *Artemisia rigida* are typically codominated by one of several species of *Eriogonum* which may also be dominant without *Artemisia rigida*. Another local diagnostic/dominant dwarf-shrub is *Artemisia papposa*. Other sagebrush taxa such as *Artemisia tridentata ssp. wyomingensis* and *Artemisia tridentata ssp. vaseyana* may be present to codominant, but not dominant. The composition of the herbaceous layer is important in separating shrublands from steppe communities within the macrogroup, but not among other macrogroups.

\*Classification Comments: Groups in this macrogroup are distinguished largely by the predominant shrub species. Other shrubs, especially shrubby *Artemisia* species such as *Artemisia tridentata* or *Artemisia tripartita*, are absent or uncommon in this dwarf-shrubland macrogroup.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M169 | Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland |  |

Similar NVC Types General Comments [optional]: Stands in this macrogroup (M170) may look similar to stands in ~Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland Macrogroup (M169)$$, but they are not dominated by *Artemisia tridentata*, although *Artemisia tridentata* may be present.

VEGETATION

Physiognomy and Structure Summary: The vegetation in this broadly defined macrogroup includes an open to moderately dense (10-25% cover) dwarf-shrub layer dominated by microphyllous evergreen shrubs with a sparse to dense herbaceous layer usually dominated by perennial graminoids (often bunchgrasses).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This broadly defined dwarf-shrubland and steppe macrogroup includes an open to moderately dense dwarf-shrub layer with a sparse to dense herbaceous layer. Several different taxa of sagebrush may dominate depending on geographic location and habitat. *Artemisia nova* is most widespread, occurring throughout most of the region on mid- to low-elevation, gravelly, calcareous well-drained soils. *Artemisia arbuscula ssp. arbuscula* occurs on low- to high-elevation sites often on shallow, fine-textured soils with a dense clay layer that impedes drainage in spring. *Artemisia arbuscula ssp. longiloba* is widespread in the Columbia Basin, Great Basin, southwestern Wyoming, and badlands in the western Great Plains (Zamora and Tueller 1973, Knight 1994). It occurs on shallow, alkaline, calcareous soils derived from shale. *Artemisia bigelovii* occurs throughout much of the Colorado Plateau and extends across northern New Mexico into southeastern Colorado on shallow soils on limestone hill and shale outcrops (Francis 1986, Shaw et al. 1989). Several other more restricted taxa may dominate, including *Artemisia tripartita ssp. rupicola* (central Wyoming), *Artemisia arbuscula ssp. longicaulis* (Lahontan Basin of northwestern Nevada, southeastern Oregon, and northeastern California), *Artemisia arbuscula ssp. thermopola* (ridgetops and benches in mountains at 1830 to 2690 m in southern Idaho), and *Artemisia frigida* (described from sites in the Rocky Mountains) (Zamora and Tueller 1973, Hironaka 1978, Knight 1994). *Artemisia rigida* is restricted to the scablands in the Columbia Basin and portions of the Snake River plain with shallow, poorly drained, lithic soils over fractured basalt that are often saturated from fall to spring by winter precipitation but typically dry out completely to bedrock by midsummer (Daubenmire 1970, Franklin and Dyrness 1973). Stands are typically codominated by diagnostic species of *Eriogonum* that include *Eriogonum compositum, Eriogonum douglasii, Eriogonum microthecum, Eriogonum niveum, Eriogonum sphaerocephalum, Eriogonum strictum*, and/or *Eriogonum thymoides* (Daubenmire 1970). These same *Eriogonum* species are also diagnostic species that may be dominant without *Artemisia rigida* (Daubenmire 1970). Another local diagnostic/dominant dwarf-shrub is *Artemisia papposa* that is restricted to poorly drained, mesic to wet sites in southern foothill basins of the Smokey Mountains of south-central Idaho and on the high plateaus of the Owyhee Plateau of southwestern Idaho and southeastern Oregon (Jankovsky-Jones et al. 2001). Other shrubs present to codominant may include *Artemisia tridentata ssp. wyomingensis, Artemisia tridentata ssp. vaseyana, Chrysothamnus viscidiflorus, Ephedra torreyana, Ephedra viridis, Grayia spinosa*, or *Purshia tridentata*, depending on habitat. The herbaceous layer is variable. If present, it ranges from sparse cushion plants, such as *Arenaria hookeri, Astragalus bisulcatus, Astragalus jejunus, Eriogonum brevicaule, Minuartia nuttallii (= Arenaria nuttallii), Phlox hoodii, Stenotus acaulis*, and *Trifolium gymnocarpon*, to moderate to dense cover of perennial grasses. Characteristic graminoids may include *Achnatherum hymenoides, Achnatherum thurberianum, Bouteloua gracilis, Carex filifolia, Danthonia unispicata, Elymus elymoides, Elymus lanceolatus, Festuca idahoensis, Hesperostipa comata, Koeleria macrantha, Leymus salinus, Pascopyrum smithii, Pleuraphis jamesii, Poa fendleriana, Poa secunda*, and *Pseudoroegneria spicata*. Scattered forbs are common and include species of *Allium, Antennaria, Astragalus, Balsamorhiza, Calochortus, Lomatium, Phlox, Sedum*, and *Stenotus*. Individual sites can be dominated by grasses and semi-woody forbs, such as *Nestotus stenophyllus (= Stenotus stenophyllus)*. Annuals may be seasonally abundant, and cover of moss and lichen is often high in undisturbed areas (1-60% cover).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: This broadly defined semi-arid dwarf-shrubland and steppe macrogroup occurs throughout much of the intermountain western U.S. Sites are generally xeric on wind-blown, shallow, gravelly or finer-textured alkaline soils. In the channeled scablands of the Columbia Basin and portions of the Snake River plain at 190-1830 m elevation, it forms extensive low xeric shrublands that occur under a relatively extreme range of seasonally wet to dry soil-moisture conditions (Daubenmire 1970, Franklin and Dyrness 1973). Here substrates are typically shallow lithic soils with limited water-holding capacity over fractured basalt. Because of poor drainage through basalt, these soils are often saturated from fall to spring by winter precipitation but typically dry out completely to bedrock by midsummer (Daubenmire 1970). Throughout eastern Oregon, northern Nevada, southern Idaho, western Montana, western Wyoming, and western Colorado, stands typically occur on mountain ridges and flanks and broad terraces, ranging from 1000 to 3000 m in elevation with stands extending to 3800 m elevation in subalpine and alpine habitats of the Sierra Nevada (Franklin and Dyrness 1973, Zamora and Tueller 1973, Hironaka 1979, Baker and Kennedy 1985, Francis 1986, Knight 1994). Substrates are shallow, fine-textured soils, poorly drained clays, shallow-soiled areas, almost always very stony, characterized by recent rhyolite or basalt or are alkaline soils derived from shale (Zamora and Tueller 1973, Baker and Kennedy 1985). These clay soils inhibit root depth and may create a perched water table. In central and southern Wyoming, sites are typically very windy, gently rolling hills and long, gently sloping pediments and fans with shallow, rocky soils (Knight 1994). This macrogroup forms the matrix vegetation and large patches on the margins of high-elevation basins. At higher elevations this type forms a mosaic with ~Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland Macrogroup (M169)$$ and is restricted to wind-blown ridges. In the Colorado Plateau, Tavaputs Plateau and Uinta Basin, stands occur in canyons, gravelly draws, hilltops, and dry flats at elevations generally below 1800 m. Soils are often rocky, shallow, and alkaline. This macrogroup also extends across northern New Mexico and Wyoming into the western Great Plains on limestone hills and shale outcrops (Francis 1986, Shaw et al. 1989).

DISTRIBUTION

\*Geographic Range: This semi-arid dwarf-shrubland and steppe macrogroup occurs throughout the intermountain western U.S. from eastern Washington, southern Idaho, southeast and southwestern Montana to northern Arizona and New Mexico, including the Columbia Plateau, Great Basin, Colorado Plateau, and Wyoming Basins regions.

Nations: US

States/Provinces: AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]: 313A:CC, 313B:CC, 313D:CC, 315A:C?, 315B:CC, 315H:CC, 321A:CC, 331A:CC, 331B:CC, 331F:CC, 331G:CC, 331K:CP, 331L:C?, 331N:CP, 341A:CC, 341B:CC, 341C:CC, 341E:CP, 341G:CC, 342B:CC, 342C:CC, 342D:CC, 342E:CP, 342F:CC, 342G:CC, 342H:CC, 342I:CC, 342J:CC, M242C:CC, M242D:CC, M261D:CC, M261G:CC, M313A:CC, M313B:CC, M331A:C?, M331B:CC, M331D:CC, M331E:CC, M331F:CP, M331G:CC, M331H:CC, M331I:CC, M332A:CC, M332D:CC, M332E:CC, M332F:CC, M332G:CC, M333A:PP, M341A:CC, M341B:CC, M341C:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G307 | Columbia Plateau Scabland Dwarf-shrubland |
| G308 | Intermountain Low & Black Sagebrush Steppe & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | *Artemisia arbuscula* Communities | Young et al. 2007a |  |
| < | *Artemisia arbuscula* habitat types | Zamora and Tueller 1973 |  |
| < | *Artemisia longiloba* habitat types | Zamora and Tueller 1973 |  |
| < | *Artemisia nova* Communities | Young et al. 2007a |  |
| < | *Artemisia nova* habitat types | Zamora and Tueller 1973 |  |
| < | *Artemisia rigida/Poa sandbergia* Association | Franklin and Dyrness 1973 |  |
| < | *Artemisia rigida/Poa sandbergia* Habitat Type | Daubenmire 1970 |  |
| ? | *Eriogono nivei-Artemisietum tridentatae* | Rivas-Martínez 1997 |  |
| < | Black Sagebrush (405) | Shiflet 1994 |  |
| < | Black Sagebrush - Bluebunch Wheatgrass (320) | Shiflet 1994 |  |
| < | Black Sagebrush - Idaho Fescue (321) | Shiflet 1994 |  |
| ? | Black sage community (*Artemisia nova-Atriplex-Neotoma* Faciation) | Fautin 1946 |  |
| < | Bluegrass Scabland (106) | Shiflet 1994 |  |
| > | Great Basin Desertscrub, Sagebrush Series - 152.11 | Brown et al. 1979 |  |
| < | Great Basin Desertscrub, Sagebrush Series, *Artemisia nova* Association - 152.113 | Brown et al. 1979 |  |
| >< | Great Basin Sagebrush | West and Young 2000 |  |
| < | Great Basin-Colorado Plateau sagebrush semi-desert | West 1983a |  |
| < | Low Sagebrush (406) | Shiflet 1994 |  |
| < | Other Sagebrush Types (408) | Shiflet 1994 | *Artemisia bigelovii* shrublands are included in this macrogroup. |
| > | Sagebrush Series | Brown et al. 1998 |  |
| >< | Sagebrush Steppe | West and Young 2000 |  |
| < | Stiff Sagebrush (407) | Shiflet 1994 |  |
| < | Threetip Sagebrush (404) | Shiflet 1994 | *Artemisia tripartita ssp. rupicola* shrublands are included in this macrogroup in the Wyoming Basins. |
| >< | Western Intermountain sagebrush steppe | West 1983c | Range overlaps. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and M. Jennings

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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3. Desert & Semi-Desert

3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland

M169. Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland

Type Concept Sentence: This macrogroup includes the big sagebrush shrubland and shrub-steppe that is a matrix and large-patch type throughout much of the intermountain western U.S. and that is dominated by *Artemisia tridentata, Purshia tridentata*, and several local dominants such as *Artemisia cana* and *Artemisia tripartita ssp. tripartita*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland (D040)

Elcode: M169

\*Scientific Name: *Artemisia tridentata - Artemisia tripartita ssp. tripartita - Purshia tridentata* Steppe & Shrubland Macrogroup

\*Common (Translated Scientific) Name: Big Sagebrush - Threetip Sagebrush - Antelope Bitterbrush Steppe & Shrubland Macrogroup

\*Colloquial Name: Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland

\*Type Concept: This sagebrush shrubland and shrub-steppe macrogroup is widely distributed in the western U.S. It has an open to dense (10-80% cover) short-shrub canopy (<2 m tall) dominated by *Artemisia tridentata*. *Purshia tridentata* is less widespread but often dominates or codominates with *Artemisia tridentata*, especially in relatively mesic and montane stands. The subspecies of *Artemisia tridentata* vary by habitat and geographic range. The most widespread taxa are *Artemisia tridentata ssp. wyomingensis* and *Artemisia tridentata ssp. tridentata*. Some stands are codominated by associated shrub species *Atriplex canescens, Atriplex confertifolia, Ephedra nevadensis, Ephedra viridis, Ericameria nauseosa, Grayia spinosa, Sarcobatus vermiculatus*, or *Tetradymia canescens*. *Artemisia tridentata ssp. tridentata, Artemisia tridentata ssp. xericensis*, and *Artemisia tripartita ssp. tripartita* are characteristic of relatively mesic environments. Mesic associates include *Peraphyllum ramosissimum, Prunus virginiana*, and *Symphoricarpos* spp. At montane elevations, *Artemisia tridentata ssp. vaseyana, Artemisia cana*, and related taxa such as *Artemisia tridentata ssp. spiciformis* dominate, sometimes with *Purshia tridentata* codominating or dominating stands. *Amelanchier utahensis* and *Symphoricarpos oreophilus* are common montane associates. The understory of this macrogroup is variable and characterized by a sparse to dense (5-50% cover) herbaceous layer that is dominated by a variety of perennial graminoid associates. On xeric sites *Achnatherum hymenoides, Hesperostipa comata, Poa secunda*, and other semi-desert associates are common. On relatively mesic or montane sites, associates include *Achnatherum occidentale, Bromus carinatus, Calamagrostis rubescens, Carex pensylvanica, Danthonia intermedia, Deschampsia cespitosa, Elymus trachycaulus, Festuca arizonica, Festuca idahoensis, Leucopoa kingii, Leymus cinereus, Poa fendleriana*, and *Pseudoroegneria spicata*. Shrub-steppes characterized by an open shrub canopy and abundant native graminoid understory are more common in the less xeric northern extent, at montane elevations and mesic microsites such as along drainages. Shrublands are more common in the drier southern extent with the core distribution in the Great Basin and Colorado Plateau. Stands are found as low as 500 m elevation in the northwestern Great Plains and up to 2500 m in the Rocky Mountains and Colorado Plateau. Xeric stands occur on flat to steeply sloping upland slopes on alluvial fans and terraces, toeslopes, lower and middle slopes, draws, badlands, foothills, and rocky slopes. Mesic stands occur on stream terraces, point bars, valley floors, alluvial fans, floodplains, washes, gullies, stabilized dunes, mesic uplands, and swales. Montane stands occur on stony flats, broad ridgetops, and mountain slopes. All aspects are represented, but occurrences at higher elevations may be restricted to south- or west-facing slopes. Soils vary from deep and well-developed to shallow rocky and poorly developed substrates.

\*Diagnostic Characteristics: This sagebrush shrubland and shrub-steppe macrogroup has an open to dense (10-80% cover) short-shrub canopy (<2 m tall) dominated by strong diagnostic species *Artemisia tridentata*. *Purshia tridentata* is a less widespread diagnostic species that often dominates or codominates with *Artemisia tridentata* or other shrubs. *Artemisia tridentata* subspecies vary by habitat and geographic range and are valuable as diagnostic taxa for classification. The most widespread diagnostic taxa are *Artemisia tridentata ssp. wyomingensis* and *Artemisia tridentata ssp. tridentata*. Stands may be codominated by associated shrub species *Amelanchier utahensis, Atriplex canescens, Ephedra nevadensis, Ephedra viridis, Ericameria nauseosa*, or *Sarcobatus vermiculatus*. Relatively mesic environments are characterized by large *Artemisia tridentata ssp. tridentata, Artemisia tridentata ssp. xericensis*, and *Artemisia tripartita ssp. tripartita*. At montane elevations *Artemisia tridentata ssp. vaseyana, Artemisia tridentata ssp. spiciformis*, and *Artemisia cana ssp. viscidula* are the dominant diagnostic taxa. The understory is variable (5-50%) and dominated by a variety of perennial graminoid associates. Shrub-steppe with abundant native graminoid understory is more common in the less xeric northern extent and at montane elevations, as well as mesic microsites such as along drainages.

\*Classification Comments: This wide-ranging and broadly defined macrogroup is characterized by *Artemisia tridentata* and several other less common sagebrushes, such as *Artemisia cana, Artemisia rothrockii, Artemisia tripartita ssp. tripartita*, and *Purshia tridentata*. S.K. Rust and other ecologists think ~Intermountain Mountain Big Sagebrush Steppe & Shrubland Group (G304)$$ should be moved out of this macrogroup and into ~Central Rocky Mountain Montane-Foothill Grassland & Shrubland Macrogroup (M048)$$ or ~Southern Rocky Mountain Montane Shrubland Macrogroup (M049)$$ because of the strong associations with *Artemisia tridentata ssp. vaseyana* and relatively mesic montane environment versus the warmer, drier environment characterized by the occurrence of *Artemisia tridentata ssp. wyomingensis* and *Artemisia tridentata ssp. tridentata* that occurs on the lower-elevation plateaus and planes of the Columbia Basin and Great Basin (S.K. Rust personal comm. 2014). Until further review, G304 will stay in this macrogroup.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M170 | Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland | is dominated by dwarf-shrubs. |

Similar NVC Types General Comments [optional]: Stands in this macrogroup (M169) may look similar to stands in ~Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland Macrogroup (M170)$$, but stands in the latter macrogroup are dominated by dwarf-shrubs such as *Artemisia nova, Artemisia arbuscula ssp. arbuscula, Artemisia arbuscula ssp. longiloba, Artemisia arbuscula ssp. longicaulis, Artemisia bigelovii, Artemisia tripartita ssp. rupicola, Artemisia arbuscula ssp. longicaulis, Artemisia arbuscula ssp. thermopola, Artemisia frigida*, and *Artemisia rigida*, although *Artemisia tridentata* may be present.

VEGETATION

Physiognomy and Structure Summary: This microphyllous-leaved evergreen and broad-leaved, cold-deciduous macrogroup is structurally characterized by open to dense sagebrush with associated shrubs interspersed. A sparse to dense perennial herbaceous understory dominated by bunchgrasses is common. Scattered forbs may be present, but typically are not.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This sagebrush shrubland and shrub-steppe macrogroup is characterized by an open to dense (10-80% cover) short-shrub canopy (<2 m tall) that is dominated by *Artemisia tridentata*. *Purshia tridentata* frequently dominates or codominates with *Artemisia tridentata*. The subspecies of *Artemisia tridentata* have diagnostic value for community classification and vary by habitat and geographic range. *Artemisia tridentata ssp. wyomingensis* and *Artemisia tridentata ssp. tridentata* are the most widespread taxa and dominate throughout much of range of this macrogroup. They may be codominated by associated shrub species such as *Atriplex canescens, Chrysothamnus viscidiflorus, Ephedra nevadensis, Ephedra viridis, Ericameria nauseosa*, or *Sarcobatus vermiculatus*. *Artemisia tridentata ssp. tridentata, Artemisia tridentata ssp. xericensis*, and *Artemisia tripartita ssp. tripartita* are characteristic of relatively mesic environments and may be codominated by *Peraphyllum ramosissimum, Prunus virginiana, Ribes cereum*, or *Symphoricarpos* spp. At montane elevations, *Artemisia tridentata ssp. vaseyana*, related taxa *Artemisia tridentata ssp. spiciformis*, and *Artemisia cana ssp. viscidula* are the dominant taxa. *Purshia tridentata* may also dominate or codominate montane stands. Common montane associates are *Amelanchier utahensis* and *Symphoricarpos oreophilus*. The understory is variable (5-50% cover) and dominated by a variety of perennial graminoid associates. On xeric sites *Achnatherum hymenoides, Hesperostipa comata, Poa secunda*, and other semi-desert associates are common. Montane and relatively mesic sites include *Achnatherum occidentale, Bromus carinatus, Calamagrostis rubescens, Carex pensylvanica, Danthonia intermedia, Deschampsia cespitosa, Elymus trachycaulus, Festuca arizonica, Festuca campestris, Festuca idahoensis, Leucopoa kingii, Leymus cinereus, Poa fendleriana*, and *Pseudoroegneria spicata*. Shrub-steppe with abundant native graminoid understory is more common in the less xeric northern extent and at montane elevations, as well as mesic microsites such as along drainages. Shrublands are more common in the drier southern extent with the core distribution in the Great Basin and Colorado Plateau.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The natural fire regime of this macrogroup likely maintains a patchy distribution of shrubs so that the general aspect of the vegetation is a grassland. Shrubs may increase following heavy grazing and/or with fire suppression, particularly in moist portions in the northern Columbia Plateau where it forms a landscape mosaic pattern with shallow-soil scabland shrublands. Response to grazing can be variable depending on the type of grazer and the season in which grazing occurs. *Hesperostipa comata* can increase in abundance in response to either grazing or fire. In central and eastern Montana (and possibly elsewhere), complexes of prairie dog towns are common in instances of this macrogroup with low sagebrush density. Microphytic crust is very important for soil moisture retention, mitigating soil erosion, and seed germination in communities of this macrogroup.

Healthy montane sagebrush shrublands can be quite productive (roughly 100-150 gC m-2 year-1), though productivity is correlated with precipitation during the growing season. They are often grazed by domestic livestock, and are strongly preferred during the growing season (Padgett et al. 1989). Prolonged livestock use can cause a decrease in net primary productivity as well as the abundance of native bunchgrasses. It can also increase the canopy cover of shrubs and non-native grass species such as *Bromus tectorum* and *Poa pratensis*. *Artemisia cana* resprouts vigorously following spring fire, and prescribed burning may increase shrub cover. Conversely, fire in the fall may decrease shrub abundance (Hansen et al. 1995).

*Artemisia tridentata* is top-killed by fire and will not resprout Stands re-establish from seedbanks or from off-site sources depending on severity of burn and usually takes over ten years for it to form occurrences having 20% or more cover. However, a study on Wyoming big sagebrush shrub-steppe in central and southeast Montana stands where median time since fire was 22 years (ranging from 4 to 67 years) found no Wyoming big sagebrush canopy cover recovery for 17 of the 24 sites, and the oldest burn was only 8% recovered (Cooper et al. 2007). Lesica et al. (2005) did a similar study in southwest Montana with similar findings. Wyoming big sagebrush stands tend to occur on drier sites than the other subspecies and may be slower to recover on drier sites (Howard 1999). Tirmenstein (1999c) and Howard (1999) found sites with high-severity or repeated burns that kill the banked sagebrush seeds and mycorrhizal spores are slow to establish new shrubs so severity of fire and other fire characteristics, such as seasonality, size/extent, complexity, intensity, and type of fire as well as fire-return interval, influence post-fire recovery. According to Johnson (2000b), fire-return intervals of 30-70 years maintain perennial bunchgrasses and non-sprouting shrubs like sagebrush; fire-return intervals of 10-30 years eliminate short-lived, sprouting shrubs; and fire-return intervals of 2-5 years eliminate perennial grasses and non-sprouting shrubs leaving invasive annual grasses and forbs.

The condition of most sagebrush steppe has been degraded due to fire suppression, overgrazing by livestock, invasion by pinyon and juniper, and the invasion and subsequent domination of the herbaceous canopy by *Bromus tectorum*. It is unclear how long it will take to restore degraded occurrences.

ENVIRONMENT

Environmental Description: *Climate:* Climate ranges from semi-arid in the western Great Basin to subhumid in the northern plains and Rocky Mountains with much of the precipitation falling primarily as snow. Temperatures are continental with large annual and diurnal variations. Annual precipitation ranges from 18-40 cm in semi-arid areas and up to 90 cm in montane and subalpine zones. Growing-season drought is common. The amount and reliability of growing-season moisture increase eastward and with higher elevation.

*Physiography/landform:* This shrubland and shrub-steppe macrogroup is widely distributed in the western U.S., at elevations as low as 300 m in the Okanagan Valley of British Columbia and 500 m in the northwestern Great Plains and up to 2500 m in the Rocky Mountains and Colorado Plateau. All aspects are represented, but the occurrences at higher elevations may be restricted to south- or west-facing slopes. Xeric stands occur on flat to steeply sloping upland slopes on alluvial fans and terraces, toeslopes, lower and middle slopes, draws, badlands, foothills, and rocky slopes. Mesic stands occur on stream terraces, point bars, valley floors, alluvial fans, floodplains, washes, gullies, stabilized dunes, mesic uplands, and swales. Montane stands occur on stony flats, broad ridgetops, and mountain slopes.

*Soil/substrate/hydrology:* Soils vary from deep and well-developed to shallow, rocky and poorly developed substrates. Soil textures range from sands to loam and clay loams, and silt derived from alluvium, loess, shale, and sandstone. There is often a significant amount of coarse fragments in the soil profile. Montane soils tend to be moderately deep and well-drained, often with high volume of coarse fragments. In drier regions, these shrublands are usually associated with perennial or ephemeral stream drainages with water tables less than 3 m from the soil surface. In British Columbia stands often occur on lacustrine soils with silty textures.

DISTRIBUTION

\*Geographic Range: This shrubland and shrub-steppe macrogroup is widely distributed from the Great Basin, Columbia River Basin, Colorado Plateau, Rocky Mountains, northeastern Great Plains and as far east as the Dakotas and into British Columbia in some southern valleys.

Nations: CA, US

States/Provinces: AZ?, BC, CA, CO, ID, MT, ND, NM, NV, OR, SD?, UT, WA, WY

USFS Ecoregions (2007) [optional]: 313A:CC, 313B:CC, 315A:CC, 315H:CC, 321A:??, 322A:CC, 331A:CP, 331B:C?, 331D:CC, 331F:CC, 331G:CC, 331H:CC, 331J:CC, 331M:C?, 331N:CP, 341A:CC, 341B:CC, 341C:CC, 341D:CC, 341E:CC, 341F:CC, 341G:CC, 342A:CC, 342B:CC, 342C:CC, 342D:CC, 342E:CC, 342F:CC, 342G:CC, 342H:CC, 342I:CC, 342J:CC, M242C:CC, M242D:CC, M261A:CC, M261D:CC, M261E:CC, M261F:C?, M261G:CC, M313A:CP, M313B:CC, M331A:CC, M331B:CC, M331D:CC, M331E:CC, M331F:CC, M331G:CC, M331H:CC, M331I:CC, M331J:CC, M332A:CC, M332B:CC, M332D:CC, M332E:CC, M332F:CC, M332G:CC, M333A:CC, M333D:CC, M334A:CC, M341A:CC, M341B:CC, M341C:CC, M341D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G303 | Intermountain Dry Tall Sagebrush Steppe & Shrubland |
| G302 | Intermountain Mesic Tall Sagebrush Steppe & Shrubland |
| G304 | Intermountain Mountain Big Sagebrush Steppe & Shrubland |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | *Artemisia cana ssp. bolanderi* Communities | Young et al. 2007a |  |
| < | *Artemisia tridentata ssp. tridentata* Communities | Young et al. 2007a |  |
| < | *Artemisia tridentata ssp. vaseyana* Communities | Young et al. 2007a |  |
| < | *Artemisia tridentata ssp. wyomingensis* Communities | Young et al. 2007a |  |
| < | *Artemisia tridentata* Communities | Young et al. 2007a |  |
| < | *Artemisietalia tridendatae* | Rivas-Martínez 1997 |  |
| < | Antelope Bitterbrush - Bluebunch Wheatgrass (104) | Shiflet 1994 | *Purshia tridentata* shrublands are included in this macrogroup. |
| < | Antelope Bitterbrush - Idaho Fescue (105) | Shiflet 1994 | *Purshia tridentata* shrublands are included in this macrogroup. |
| < | Basin Big Sagebrush (401) | Shiflet 1994 | This is the primary macrogroup crosswalking to this SRM type. |
| < | Big Sagebrush - Bluebunch Wheatgrass (314) | Shiflet 1994 |  |
| < | Big Sagebrush - Idaho Fescue (315) | Shiflet 1994 |  |
| < | Bitterbrush (210) | Shiflet 1994 | *Purshia tridentata* steppe is included in this macrogroup. |
| < | Bitterbrush - Bluebunch Wheatgrass (317) | Shiflet 1994 | Bitterbrush-dominated communities are included in the big sage steppe macrogroup. |
| < | Bitterbrush - Idaho Fescue (318) | Shiflet 1994 | Bitterbrush-dominated communities are included in the big sage steppe macrogroup. |
| < | Bitterbrush - Rough Fescue (319) | Shiflet 1994 | Bitterbrush-dominated communities are included in the big sage steppe macrogroup. |
| > | Great Basin Desertscrub, Sagebrush Series - 152.11 | Brown et al. 1979 |  |
| < | Great Basin Desertscrub, Sagebrush Series, *Artemisia tridentata* Association - 152.111 | Brown et al. 1979 |  |
| < | Great Basin Desertscrub, Sagebrush Series, *Artemisia tridentata*-Mixed Scrub-Grass Association - 152.112 | Brown et al. 1979 |  |
| < | Great Basin Sagebrush | West and Young 2000 |  |
| < | Great Basin-Colorado Plateau sagebrush semi-desert | West 1983a |  |
| >< | Other Sagebrush Types (408) | Shiflet 1994 | *Artemisia tridentata ssp. spiciformis* shrublands are included in this macrogroup. |
| < | Sagebrush - Grass (612) | Shiflet 1994 | *Artemisia tridentata ssp. tridentata* steppe communities are included in this macrogroup. |
| < | Sagebrush Steppe | West and Young 2000 |  |
| < | Sagebrush association (*Artemisietum tridentatae*) | Billings 1945 |  |
| < | Sagebrush community (*Artemisia-Agropyron-Lepus* Association) | Fautin 1946 |  |
| < | Threetip Sagebrush (404) | Shiflet 1994 | *Artemisia tripartita ssp. tripartita* shrublands are included in this macrogroup in the northern Great Basin, Columbia Plateau and northern Rockies regions. |
| < | Threetip Sagebrush - Idaho Fescue (324) | Shiflet 1994 | *Artemisia tripartita ssp. tripartita* communities are included in this macrogroup. |
| < | Western Intermountain sagebrush steppe | West 1983c | Range overlaps. |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and M. Jennings

Acknowledgments [optional]: We have incorporated significant descriptive information previously compiled by M.E. Hall.

Version Date: 26 Jan 2016

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3. Desert & Semi-Desert

3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland

M095. Great Basin-Intermountain Xeric-Riparian Scrub

Type Concept Sentence: This macrogroup covers shrublands along dry washes and valley floors dominated by *Atriplex canescens, Ericameria nauseosa, Artemisia tridentata ssp. tridentata*, and other species within the cool temperate desert of western North America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland (D040)

Elcode: M095

\*Scientific Name: Great Basin-Intermountain Xeric-Riparian Scrub Macrogroup

\*Common (Translated Scientific) Name: Great Basin-Intermountain Xeric-Riparian Scrub Macrogroup

\*Colloquial Name: Great Basin-Intermountain Xeric-Riparian Scrub

\*Type Concept: This macrogroup consists of shrublands along temporary watercourses (washes) on sandy terraces, wash bottoms, and basin floors dominated by *Artemisia filifolia, Artemisia tridentata ssp. tridentata, Atriplex canescens, Atriplex confertifolia, Atriplex gardneri, Brickellia longifolia, Ephedra torreyana, Ephedra viridis, Ericameria nauseosa, Fraxinus anomala, Gutierrezia sarothrae, Lycium andersonii, Purshia stansburiana, Quercus havardii, Rhus trilobata*, and *Suaeda moquinii*. Herbaceous cover is sparse, although non-native annuals such as *Bromus tectorum* and *Salsola tragus* are sometimes abundant. This macrogroup occurs within the cool temperate desert of the intermountain western U.S.

\*Diagnostic Characteristics: Open scattered to dense shrublands dominated by *Atriplex canescens* or *Ericameria nauseosa*.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Broadleaf deciduous shrubland.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Stands have generally fairly open cover of *Atriplex canescens* or *Ericameria nauseosa*. Associated shrubs include *Artemisia filifolia, Artemisia tridentata ssp. tridentata, Atriplex confertifolia, Atriplex gardneri, Brickellia longifolia, Ephedra torreyana, Ephedra viridis, Ericameria nauseosa, Fraxinus anomala, Gutierrezia sarothrae, Lycium andersonii, Purshia stansburiana, Quercus havardii, Rhus trilobata, Sarcobatus vermiculatus*, and *Suaeda moquinii (= Suaeda torreyana)*. Herbaceous cover is sparse (<10% cover) with a variety of grasses and forbs such as *Achnatherum hymenoides, Artemisia dracunculus, Descurainia pinnata, Elymus elymoides, Glycyrrhiza lepidota, Hesperostipa comata, Hordeum jubatum, Muhlenbergia porteri, Pleuraphis jamesii, Sphaeralcea parvifolia, Sporobolus contractus, Sporobolus cryptandrus, Stanleya pinnata*, and *Scabrethia scabra (= Wyethia scabra)*. Non-native annuals such as *Bromus tectorum* and *Salsola tragus* are sometimes present to abundant.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: This macrogroup experiences severe disturbance by flash floods. The vegetation is usually scattered, occurring in parts of the channel protected from the worst flooding, and shrubs have extensive root systems to allow them to resprout quickly when damaged or partially uprooted by flooding, as well as small roots to immediately take advantage of recent moisture.

ENVIRONMENT

Environmental Description: This macrogroup occurs approximately from 1000 to 2500 m in elevation, along dry washes and intermittent stream courses, along the edges or within the flat wash and valley bottoms, and on elevated side terraces. Soils and substrates are rapidly drained, sandy or gravelly soils derived from alluvium, gneiss, shale, cinder and sandstone.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs throughout the intermountain western U.S. extending east into the western Great Plains.

Nations: US

States/Provinces: AZ, CA, CO, ID, MT, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]: 313A:CC, 313B:CC, 313D:CC, 315H:PP, 331B:CC, 331H:C?, 331I:CC, 331J:CC, 341A:CC, 341B:CC, 341C:CC, 341D:CC, 341E:CC, 341F:CC, 341G:CC, 342A:CC, 342E:CC, 342F:CC, 342G:CC, M313A:CC, M313B:CP, M331I:??, M341A:CC, M341B:CC, M341C:CC, M341D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G559 | Great Basin-Intermountain Shrub & Herb Wash-Arroyo |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| ? | Rabbitbrush association (*Chrysothamnnetum nauseosi*) | Billings 1945 |  |
| > | Riparian (422) | Shiflet 1994 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and G. Kittel

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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3. Desert & Semi-Desert

3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland

M093. Great Basin Saltbush Scrub

Type Concept Sentence: This widespread cool semi-desert macrogroup centers in the Intermountain West of the U.S. and is typically composed of saltbush shrublands. Dominants include *Atriplex canescens, Atriplex confertifolia, Atriplex corrugata, Atriplex cuneata, Atriplex gardneri, Atriplex lentiformis, Atriplex obovata, Atriplex polycarpa*, and *Atriplex spinifera*, either singly or mixed, sometimes codominated by other associated species. Substrates are typically saline, alkaline, fine-textured soils developed from shale or alluvium.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland (D040)

Elcode: M093

\*Scientific Name: *Atriplex confertifolia - Atriplex canescens - Atriplex corrugata* Great Basin Scrub Macrogroup

\*Common (Translated Scientific) Name: Shadscale Saltbush - Fourwing Saltbush - Mat Saltbush Great Basin Scrub Macrogroup

\*Colloquial Name: Great Basin Saltbush Scrub

\*Type Concept: This widespread cool semi-desert macrogroup centers in the Intermountain West of the U.S. The vegetation is characterized by open to moderately dense cover of shrubs (<2 m tall), both short shrubs and/or dwarf-shrubs, with a typically sparse herbaceous layer composed of perennial bunchgrasses. Dominant shrubs may include *Atriplex canescens, Atriplex confertifolia, Atriplex cuneata, Atriplex lentiformis, Atriplex obovata, Atriplex polycarpa*, and *Atriplex spinifera*. Dominant dwarf-shrubs may include *Atriplex corrugata, Atriplex gardneri, Picrothamnus desertorum, Sarcobatus baileyi* (Carson Desert), and *Psorothamnus polydenius* (sandy soils). Sometimes stands are codominated by *Artemisia tridentata, Krascheninnikovia lanata*, or species of *Ephedra* and *Lycium*. Some stands dominated by *Grayia spinosa* are also included in this macrogroup. Many other shrubs may be present, especially in transition areas with desert or montane scrub. Medium-tall and short perennial grasses often dominate the sparse to moderately dense graminoid layer, including *Achnatherum hymenoides, Bouteloua gracilis, Distichlis spicata, Elymus elymoides, Hesperostipa comata, Leymus ambiguus, Leymus salinus, Pascopyrum smithii, Pleuraphis jamesii, Poa secunda, Pseudoroegneria spicata, Sporobolus airoides*, and *Sporobolus cryptandrus*. The species present depend on the geographic range of the grasses, soil alkalinity/salinity, and past land use. A number of annual species may also grow in association with the shrubs and grasses, although they are usually rare and confined to areas of recent disturbance. Forb cover is generally sparse. This salt-desert shrubland macrogroup is matrix-forming in the Intermountain West. It forms large, small and linear patches in the Mojave and Sonoran deserts and extends east into the southern Great Plains. It occurs on gentle slopes and rolling plains in the northern Colorado Plateau and Uinta Basin on Mancos shale and semi-arid, windswept plains and basins across parts of Wyoming. Elevations range between 1520 and 2200 m (4987-7218 feet). Sites can be found on all aspects and include valley bottoms, alluvial and alkaline flats, mesas and plateaus, playas, drainage terraces, washes and interdune basins, bluffs, and gentle to moderately steep sandy or rocky slopes. Soils are shallow to moderately deep, poorly developed, and a product of a semi-arid climate. Substrates are typically saline, alkaline, fine-textured soils developed from shale or alluvium. Infiltration rate is typically low. Soil surface is often very barren and interspaces between the characteristic plant clusters are commonly covered by a microphytic crust.

\*Diagnostic Characteristics: The macrogroup is characterized by an open to moderately dense shrubland composed of one or more *Atriplex* species, such as *Atriplex canescens, Atriplex confertifolia, Atriplex corrugata, Atriplex gardneri, Atriplex polycarpa*, or *Atriplex spinifera*. Other dominant or codominant dwarf-shrubs may include *Artemisia longifolia, Artemisia pedatifida* (very important in Wyoming, rare in Colorado stands), or *Picrothamnus desertorum*, sometimes with a mix of other low shrubs, such as *Grayia spinosa, Krascheninnikovia lanata*, or *Tetradymia spinosa*. Occasional individuals or small clumps of *Artemisia tridentata ssp. wyomingensis* may be present in some stands within this macrogroup but do not codominate.

\*Classification Comments: This macrogroup is more broadly defined. Some *Grayia spinosa*-dominated stands occur on flats, toeslopes and coppice dunes that have a silty component to them. If they occur on deep sand or dunes, then consider a dune group. Stands in this macrogroup may grade into sparse vegetation macrogroups on shale barrens/badlands. Welsh (1957) observed that *Atriplex corrugata* stands were restricted to north and east aspects on Mancos shale, with south and west aspects nearly barren.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M086 | Chihuahuan Desert Scrub | may share widespread species, but typically has Chihuahuan Desert indicator species present. |
| M171 | Great Basin-Intermountain Dry Shrubland & Grassland | shares floristics, including *Krascheninnikovia lanata* and various herbaceous species, but *Atriplex* spp. are not characteristic. |
| M118 | Intermountain Basins Cliff, Scree & Badland Sparse Vegetation | may share species, but badland vegetation is much sparser and has fewer species. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup typically has an open canopy composed of facultatively deciduous, extremely xeromorphic, subdesert short and dwarf-shrubs often with a sparse to moderately dense herbaceous layer dominated by perennial graminoids.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This widespread cool semi-desert scrub macrogroup is highly variable and ranges from almost pure occurrences of single species to fairly complex mixtures. The vegetation is characterized by open to moderately dense cover of shrubs (<2 m tall), both short shrubs and/or dwarf-shrubs, with a typically sparse herbaceous layer composed of perennial bunchgrasses with large open spaces between the plants (Blaisdell and Holmgren 1984). Dominant short shrubs may include *Atriplex canescens, Atriplex confertifolia, Atriplex cuneata, Atriplex lentiformis, Atriplex obovata, Atriplex polycarpa*, and *Atriplex spinifera*. Stands are sometimes codominated by *Artemisia tridentata, Krascheninnikovia lanata*, or species of *Ephedra* and *Lycium*. Dominant dwarf-shrubs may include *Atriplex corrugata, Atriplex gardneri, Picrothamnus desertorum, Sarcobatus baileyi* (Carson Desert), and *Psorothamnus polydenius* (sandy soils). Some stands dominated by *Grayia spinosa* are also included in this macrogroup. Other shrubs may be present, especially in transition areas with desert or montane scrub. Common associated species are *Acacia greggii, Chrysothamnus* spp., *Encelia frutescens, Ephedra nevadensis, Ephedra viridis, Frankenia salina, Gutierrezia sarothrae, Krascheninnikovia lanata, Lycium andersonii, Lycium pallidum, Lycium shockleyi, Parthenium confertum, Psorothamnus polydenius, Purshia stansburiana, Suaeda* spp., *Tetradymia spinosa, Tiquilia latior*, and *Yucca glauca*. Northward in Wyoming and Montana, the type is most often associated with shale foothills and badlands where soils are saline, but also on alkaline clays and silts with low infiltration rates. There, relatively pure stands of *Atriplex gardneri* or (in southeastern Montana) *Artemisia pedatifida* are found, with some *Artemisia longifolia, Atriplex confertifolia, Krascheninnikovia lanata, Picrothamnus desertorum*, and *Tetradymia spinosa*. Warm-season medium-tall and short perennial grasses dominate in the sparse to moderately dense graminoid layer. The species present depend on the geographic range of the grasses, soil alkalinity/salinity, and past land use. Species may include *Achnatherum hymenoides, Achnatherum thurberianum, Bouteloua gracilis, Distichlis spicata, Elymus elymoides, Hesperostipa comata, Leymus ambiguus, Leymus salinus, Muhlenbergia torreyi, Pascopyrum smithii, Pleuraphis jamesii, Poa secunda, Pseudoroegneria spicata, Sporobolus airoides*, and *Sporobolus cryptandrus*. A number of annual species may also grow in association with the shrubs and grasses, although they are usually rare and confined to areas of recent disturbance (Blaisdell and Holmgren 1984). Forb cover is generally sparse. Perennial forbs that might occur include *Chaetopappa ericoides, Mentzelia* spp., *Sphaeralcea coccinea*, and *Xylorhiza venusta*. Annual natives include *Monolepis nuttalliana, Plantago* spp., or *Vulpia octoflora*. Associated halophytes include *Salicornia bigelovii, Salicornia rubra*, and *Suaeda* species. Exotic annuals that may occur include *Bromus rubens, Bromus tectorum, Descurainia sophia*, and *Salsola kali*. Cacti such as species of *Opuntia* and *Echinocereus* may be present in some occurrences. Trees are not usually present but some scattered *Juniperus* spp. may be found.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: West (1982) stated that "salt desert shrub vegetation occurs mostly in two kinds of situations that promote soil salinity, alkalinity, or both. These are either at the bottom of drainages in enclosed basins or where marine shales outcrop." However, salt-desert shrub vegetation may be an indication of climatically dry as well as physiologically dry soils (Blaisdell and Holmgren 1984). Not all salt-desert shrub soils are salty, and their hydrologic characteristics may often be responsible for the associated vegetation (Naphan 1966). Species of the salt-desert shrub complex have different degrees of tolerance to salinity and aridity, and they tend to sort themselves out along a moisture/salinity gradient (West 1982). Species and communities are apparently sorted out along physical, chemical, moisture, and topographic gradients through complex relations that are not understood and are in need of further study (Blaisdell and Holmgren 1984).

The winter months are a good time for soil moisture accumulation and storage within stands in this macrogroup. There is generally at least one good snowstorm per season that will provide sufficient moisture to the vegetation. The winter moisture accumulation amounts will affect spring plant growth. Plants may grow as little as a few inches to 1 m. Unless more rains come in the spring, the soil moisture will be depleted in a few weeks, growth will slow and ultimately cease, and the perennial plants will assume their various forms of dormancy (Blaisdell and Holmgren 1984). If effective rain comes later in the warm season, some of the species will renew their growth from the stage at which it had stopped. Others, having died back, will start over as if emerging from winter dormancy (Blaisdell and Holmgren 1984). *Atriplex confertifolia* shrubs often develop large leaves in the spring, which increase the rate of photosynthesis. As soil moisture decreases, the leaves are lost, and the plant takes on a dead appearance. During late fall, very small overwintering leaves appear which provide some photosynthetic capability through the remainder of the year. Other communities are maintained by intra- or inter-annual cycles of flooding followed by extended drought, which favor accumulation of transported salts. The moisture supporting these intermittently flooded wetlands is usually derived off-site, and they are dependent upon natural watershed function for persistence (Reid et al. 1999).

*Atriplex corrugata*-dominated shrublands are the most saline-tolerant of the Mancos shale plant communities studied by Branson et al. (1976). *Atriplex corrugata* can completely dominate these extremely saline sites (Branson et al. 1976). It is a true evergreen dwarf-shrub retaining leaves for several years, and branches are capable of rooting at the nodes. This plant utilizes winter soil moisture, beginning new growth in March when the soils are relatively warm and moist. It flowers in April, and by mid-July fruits are shattered (Branson et al. 1976). If the soils dry out in mid-summer, it can go dormant until the late-summer monsoon rains begin. Large areas of *Atriplex corrugata* died during the extreme drought of 2002 in the Four Corners area. By 2004, new seedlings were established and spreading; shrub cover recovered to approximately 50% of what it was before the drought. *Atriplex gardneri*-dominated vegetation is another saline/drought-tolerant example of the Mancos shale plant communities studied by Branson et al. (1976). Although very slow-growing, it can completely dominate these extremely saline sites (Branson et al. 1976).

In summary, desert communities of perennial plants are dynamic and changing. The composition within this macrogroup may change dramatically and may be both cyclic and unidirectional. Superimposed on the compositional change is great variation from year to year in growth of all the vegetation, the sum of varying growth responses of individual species to specific conditions of different years (Blaisdell and Holmgren 1984). Desert plants grow when temperature is satisfactory, but only if soil moisture is available at the same time. Because the amount of moisture is variable from year to year and because different species flourish under different seasons of soil moisture, seldom do all components of the vegetation thrive in the same year (Blaisdell and Holmgren 1984).

ENVIRONMENT

Environmental Description: This salt-desert shrubland macrogroup is matrix-forming in the Intermountain West and forms large, small and linear patches in the Mojave and Sonoran deserts. It occurs on gentle slopes and rolling plains in the northern Colorado Plateau and Uinta Basin on Mancos shale and arid, windswept plains and basins across parts of Wyoming. This macrogroup is comprised of arid to semi-arid shrublands on lowland and upland sites usually at elevations between 1520 and 2200 m (4987-7218 feet).

*Climate:* This is typically a macrogroup of extreme climatic conditions, with warm to hot summers and freezing winters. Climate is largely temperate and semi-arid with mean annual precipitation ranging from 13-33 cm. The period of greatest precipitation is typically in mid to late summer, although in the more northern areas, a moist period is to be expected in the cold part of the year. However, in Montana and Wyoming, approximately two-thirds of the annual precipitation falls in spring and early summer. In Colorado and Utah, over half the precipitation occurs in the late-summer monsoons as high-intensity thunderstorms. However, plotted seasonality of occurrence is probably of less importance on this desert vegetation than in other types because desert precipitation comes with an extreme irregularity that does not appear in graphs of long-term seasonal or monthly averages (Blaisdell and Holmgren 1984).

*Physiography/landform:* Stands can be found on all aspects and include valley bottoms, alluvial and alkaline flats, mesas and plateaus, playas, drainage terraces, washes and interdune basins, bluffs, and gentle to moderately steep sandy or rocky slopes. Slopes are typically gentle to moderately steep but are sometimes unstable and prone to surface movement.

*Soil/substrate/hydrology:* Soils are shallow to moderately deep, poorly developed, and a product of a semi-arid climate. Substrates are typically saline, alkaline, fine-textured soils developed from shale or alluvium and may be associated with shale badlands. Infiltration rate is typically low. In Wyoming and possibly elsewhere, inclusions of non-saline, gravelly barrens or rock outcrops may be present. In Montana, this type is found on gentle slopes, rolling plains and badlands in the northeastern Great Plains, as well as in the Wyoming Basin in extreme south-central and southeastern portions of the state. Across its range, the shallow soils of much of the area are poorly developed Entisols. Vegetation within this macrogroup is tolerant of these soil conditions but not restricted to it and can occur on level pediment remnants where coarse-textured and well-developed soil profiles have been derived from sandstone gravel and are alkaline, or on Mancos shale badlands, where soil profiles are typically fine-textured and non-alkaline throughout (West and Ibrahim 1968). On Mancos shale (and possibly other saline marine shales), stands may be restricted to gentler slopes and cooler north and east aspects, with steeper south and west aspects nearly barren (Welsh 1957). Many areas are degraded due to erosion and may resemble "badlands." Soil surface is often very barren and interspaces between the characteristic plant clusters are commonly covered by a biological soil crust (West 1982). Stands can also occur in alluvial basins where parent materials from other habitats have been deposited over Mancos shale and the soils are heavy-textured and saline-alkaline throughout the profile (West and Ibrahim 1968).

DISTRIBUTION

\*Geographic Range: The distribution of this widespread macrogroup centers in the Intermountain West of the U.S. from the Columbia Plateau south into the Mojave Desert and Sonoran Desert. In the north it extends east into the basins and plains across Wyoming, and Montana and possibly into Canada. To the south in extends from the Colorado Plateau across northern New Mexico into the southern Great Plains.

Nations: CA?, MX?, US

States/Provinces: AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]: 313A:CC, 313B:CC, 313D:CC, 315A:CC, 315B:CP, 315H:CC, 321A:CC, 322A:CC, 331A:CP, 331B:CC, 331F:CC, 331G:CC, 331H:CC, 331I:CC, 331J:CC, 341A:CC, 341B:CC, 341C:CC, 341D:CC, 341E:CC, 341F:CC, 341G:CC, 342A:CC, 342B:CC, 342C:CC, 342D:CC, 342E:CC, 342F:CC, 342G:CC, 342H:CC, 342I:CC, 342J:CC, M242C:PP, M261D:CP, M261E:CP, M261G:CC, M313A:CC, M313B:CC, M331A:CC, M331B:CC, M331D:CC, M331E:CC, M331F:CC, M331G:CC, M331H:CC, M331I:CC, M331J:C?, M332A:CP, M332E:CC, M332F:CC, M332G:CP, M341A:CC, M341B:CC, M341C:CC, M341D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G301 | Intermountain Dwarf Saltbush - Sagebrush Scrub |
| G300 | Intermountain Shadscale - Saltbush Scrub |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | *Atriplex canescens* (Fourwing saltbush scrub) Alliance | Sawyer et al. 2009 | 36.310.00 |
| < | *Atriplex confertifolia* (Shadscale scrub) Alliance | Sawyer et al. 2009 | 36.320.00 |
| < | *Atriplex hymenelytra* (Desert holly scrub) Alliance | Sawyer et al. 2009 | 36.330.00 |
| < | *Atriplex polycarpa* (Allscale scrub) Alliance | Sawyer et al. 2009 | 36.340.00 |
| < | *Atriplicetum confertifolio gardnerii* association | Rivas-Martínez 1997 |  |
| < | *Atriplici canescentis-Psorothamnetum polydenii* association | Peinado et al. 2013 |  |
| < | *Atriplici confertifoliae-Sarcobatetum bailey* association | Peinado et al. 2013 |  |
| < | *Atriplicion confertifolio-gardnerii* Alliance | Rivas-Martínez 1997 |  |
| < | Biotic Matrix of the Shadscale and Associated Communities | Fautin 1946 |  |
| < | Dalea association (*Daleetum polydenii*) | Billings 1945 |  |
| < | Great Basin Desertscrub, Mixed Shrub Series152.15 | Brouillet et al. 1998 |  |
| < | Great Basin Desertscrub, Saltbush Series152.17 | Brouillet et al. 1998 |  |
| < | Great Basin Desertscrub, Shadscale Series, *Atriplex confertifolia* Association - 152.121 | Brown et al. 1979 |  |
| < | Great Basin Desertscrub, Shadscale Series, *Atriplex confertifolia*-Mixed Shrub Association - 152.122 | Brown et al. 1979 |  |
| < | Great Basin Desertscrub, Shadscale Series152.12 | Brouillet et al. 1998 |  |
| < | Great Basin Desertscrub, Winterfat Series, *Eurotia lanata* Association - 152.151 | Brown et al. 1979 |  |
| < | Great Basin Desertscrub, Winterfat Series, *Eurotia lanata*-Mixed Shrub Association - 152.152 | Brown et al. 1979 |  |
| < | Great Basin Desertscrub, Winterfat Series152.16 | Brouillet et al. 1998 |  |
| ? | Intermountain Salt-Desert Shrubland | West 1983b |  |
| < | Little Greasewood-Shadscale association (*Sarcobatetum baileyi*) | Billings 1945 |  |
| < | Mat-*Atriplex* Association | Graham 1937 |  |
| < | Mohave Desertscrub, Saltbush Series153.16 | Brouillet et al. 1998 |  |
| >< | Other Sagebrush Types (408) | Shiflet 1994 |  |
| < | Salt Desert Plant Communities | Thorne et al. 2007 |  |
| = | Salt Desert Shrub (414) | Shiflet 1994 |  |
| >< | Saltbush - Greasewood (501) | Shiflet 1994 |  |
| < | Saltbush Desert Shrubland | Knight 1994 |  |
| < | Saltbush Desert shrubland | Knight et al. 1987 |  |
| < | Saltbush Scrub | Schoenherr and Burk 2007 |  |
| < | Shadscale Community | Fautin 1946 |  |
| < | Sonoran Desertscrub, Saltbush Series154.17 | Brouillet et al. 1998 |  |
| < | Tetradymia Community | Fautin 1946 |  |
| < | Vegetation of Bajadas, Hills, and Washes; *Atriplex hymenelytra* Scrub | Keeler-Wolf 2007 |  |
| < | Vegetation of Lower Basins and Playas, Saltbush Scrub | Keeler-Wolf 2007 |  |
| < | Vegetation of Upper Bajadas and Mountain Slopes; Shadscale Scrub (*Atriplex confertifolia*) | Keeler-Wolf 2007 |  |
| < | Vegetation on Manco Shale | Welsh 1957 |  |
| < | Winter-fat association (*Eurotietum lanatae*) | Billings 1945 |  |
| < | Winterfat Community | Fautin 1946 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz

Acknowledgments [optional]:

Version Date: 26 Jan 2016

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3. Desert & Semi-Desert

3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland

M118. Intermountain Basins Cliff, Scree & Badland Sparse Vegetation

Type Concept Sentence: This sparsely vegetated macrogroup occurs in a variety of landscapes and a variety of exposed rock and badland substrates the interior western U.S. from the Columbia Plateau south to the Great Basin and Colorado Plateau, and east into Wyoming basins. Characteristic species are variable depending on substrate and other environmental condition and most of the species also occur in non-sparse vegetation macrogroups, although some of the sites with harsh soil properties may have of endemic species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 3.B.1.Ne. Western North American Cool Semi-Desert Scrub & Grassland (D040)

Elcode: M118

\*Scientific Name: *Atriplex* spp. - *Ephedra* spp. - *Eriogonum* spp. Intermountain Basins Sparse Vegetation Macrogroup

\*Common (Translated Scientific) Name: Saltbush species - Joint-fir species - Buckwheat species Intermountain Basins Sparse Vegetation Macrogroup

\*Colloquial Name: Intermountain Basins Cliff, Scree & Badland Sparse Vegetation

\*Type Concept: This macrogroup consists of landscapes that are sparsely vegetated by vascular plants and are on a variety of rock and badland substrates in the interior western U.S. from the Columbia Plateau south to the Great Basin and Colorado Plateau, east into Wyoming Basins. Species are variable depending on substrate, nutrient availability, and other environmental conditions. Characteristic shrub species in lower elevation semi-desert, lava field, and badland areas include *Artemisia tridentata, Atriplex* spp., *Ephedra* spp., *Eriogonum* spp., *Fallugia paradoxa, Grayia spinosa, Psorothamnus* spp., *Purshia tridentata, Salvia dorrii*, and *Sarcobatus vermiculatus*. Characteristic herbs include species of *Achnatherum, Camissonia, Cleome, Eriogonum*, and *Mentzelia*. Characteristic specie of canyon, foothill and lower montane sites include shrubs *Artemisia tridentata, Cercocarpus intricatus, Cercocarpus ledifolius, Holodiscus* spp., and trees *Juniperus occidentalis* (Columbia Basin), *Juniperus osteosperma, Pinus edulis* and *Pinus ponderosa* (Colorado Plateau), and *Pinus monophylla* (Great Basin). Most of the species also occur in non-sparse vegetation macrogroups. However, many of the sites have harsh plant growing soil properties such as strongly alkalinity and/or salinity with thin soil or unstable, eroding substrates that limit the abundance and numbers of species that can occur. Some sites have a high number of endemic perennial species. This cool semi-desert type occurs in a variety of sites ranging from low elevation basins to middle elevations foothill and lower montane sites, but does not include higher elevation cool temperate sites in montane and subalpine zones. Landforms include lava fields, cliffs and canyon sides, ridgetops, and rock outcrops on mesas, plateaus, and mountains. Substrates are variable and include sandstone slick rock, shale badlands and volcanic deposits.

\*Diagnostic Characteristics: Diagnostic characteristics of this lithomorphic macrogroup are near barren or sparsely vegetated rock and badland substrates and its geographic location, which is the intermountain western U.S. However, it is often composed of a mix of woody vegetation, especially shrubs and herbs (particularly cushion plants), although either may be absent on a given site. Characteristic species include *Arctostaphylos patula, Artemisia tridentata, Atriplex canescens, Atriplex corrugata, Atriplex gardneri, Artemisia pedatifida, Atriplex confertifolia, Cercocarpus intricatus, Cercocarpus ledifolius, Ephedra* spp., *Eriogonum corymbosum, Eriogonum heermannii, Eriogonum ovalifolium, Fallugia paradoxa, Glossopetalon* spp., *Grayia spinosa, Holodiscus* spp., *Ivesia* sp., *Juniperus occidentalis, Juniperus osteosperma, Pinus edulis, Pinus monophylla, Pinus ponderosa, Purshia tridentata, Salvia dorrii*, and *Sarcobatus vermiculatus*. Nonvascular species, especially lichens, but also algae, bacteria and mosses, are important on some sites, and biological soil crusts (associations of nonvascular species) can be particularly important and diverse (based on substrate, moisture availability, disturbance, etc.) ( Belnap and Lange 2003).

\*Classification Comments: This macrogroup is very diverse floristically and so it is difficult to determine indicator species. More diagnostic is the sparse cover of vascular plants and/or presence and sometimes abundance of nonvascular species (e.g., algae, bacteria, bryophytes, lichens, and microfungi).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M117 | North American Warm Semi-Desert Cliff, Scree & Rock Vegetation | criteria are needed to determine where this macrogroup (M118) transitions into this cool desert macrogroup (M117). |
| M171 | Great Basin-Intermountain Dry Shrubland & Grassland | is similar and transitions with this macrogroup when vegetation becomes sparse (1-9% total vascular cover). |
| M093 | Great Basin Saltbush Scrub |  |
| M115 | Great Plains Badlands Vegetation | M118 is similar and transitions into this Great Plains macrogroup (M115) in Wyoming. |
| M116 | Great Plains Cliff, Scree & Rock Vegetation | M118 is similar and transitions into this Great Plains macrogroup (M116) in Wyoming. |

Similar NVC Types General Comments [optional]: This macrogroup contains cool semi-desert sites that lack warm-semi-desert indicator species that are intolerant of extended periods of freezing temperatures and found in ~North American Warm Semi-Desert Cliff, Scree & Rock Vegetation Macrogroup (M117)$$. However, the macrogroup may occur in high elevation sites in desert mountains where extended freezing periods occur.

VEGETATION

Physiognomy and Structure Summary: This macrogroup may be composed of woody plants, including both trees and shrubs, herbaceous plants, and/or nonvascular plants. Shrubs are especially common and were chosen as indicator species, however, herbs, especially cushion plants, and nonvascular organisms such as mosses or lichens may be more common.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This macrogroup consists of sparsely vegetated rock and badland substrates from a variety of landscapes in the interior western U.S. Species are variable depending on substrate and other environmental conditions. Characteristic shrub species in lower elevation semi-desert, lava field, and badland areas include *Artemisia tridentata, Atriplex canescens, Atriplex corrugata, Atriplex gardneri, Artemisia pedatifida, Atriplex confertifolia, Ephedra* spp., *Eriogonum corymbosum, Eriogonum heermannii, Eriogonum ovalifolium, Fallugia paradoxa, Grayia spinosa, Purshia tridentata, Salvia dorrii*, and *Sarcobatus vermiculatus*. Characteristic herbs include species of *Achnatherum, Camissonia, Cleome, Eriogonum*, and *Mentzelia*. Characteristic specie of canyon, foothill and lower montane sites include forb *Ivesia* sp., shrubs *Arctostaphylos patula, Artemisia tridentata, Cercocarpus intricatus, Cercocarpus ledifolius, Ephedra* spp., *Glossopetalon* spp., *Holodiscus* spp., *Purshia tridentata*, and trees *Juniperus occidentalis* (Columbia Basin), *Juniperus osteosperma, Pinus edulis* and *Pinus ponderosa* (Colorado Plateau), and *Pinus monophylla* (Great Basin). Shrubs may include *Cercocarpus ledifolius, Ephedra* spp., *Ivesia* sp., and. Most of the species also occur in non-sparse vegetation macrogroups. However, some of the sites with harsh soil properties have a high number of endemic perennial species (Welsh 1979, Welsh and Chatterly 1985).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Following wildfire, various associations which are typically woodland and shrubland will have transitional stages that are sparsely vegetated. However, most stands in this macrogroup are edaphic types and are largely defined by their substrates. Biological soil crusts can improve soil stability and soil fertility, and disturbances such as grazing and non-native species invasion can negatively impact these crusts (Belnap and Eldridge 2003, Belnap et al. 2006).

ENVIRONMENT

Environmental Description: This macrogroup consists of landscapes that are sparsely vegetated by vascular plants on a variety of rock and badland substrates. This cool semi-desert type ranges from low elevation basins to middle elevations foothill and lower montane sites, but does not include higher elevation cool temperate sites in upper montane and subalpine zones. Landforms include lava fields, cliffs and canyon sides, ridgetops, and rock outcrops on mesas, plateaus, and mountains. Substrates are variable and include sandstone slick rock, shale badlands and volcanic deposits such as lava, cinder, ash, tuff and basalt dikes. Some substrates, such as marine shales are strongly alkaline and/or saline which chemically limits plant growth. Active substrates such as scree slopes are difficult sites for plants to grow. Physical properties of substrates may also limit plant growth. Some massive rock substrates lack cracks where vascular plants can root. Badland sites often have heavy clay soils that reduce water infiltration increasing erosion rates and reducing soil moisture for plants.

DISTRIBUTION

\*Geographic Range: This sparsely vegetated macrogroup occurs in the interior western U.S. from the Columbia Plateau south to the Great Basin and Colorado Plateau, east into Wyoming Basins.

Nations: US

States/Provinces: AZ, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]: 341:C, 342:C, M261:C, M313:C, M331:C, M332:C, M341:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G570 | Intermountain Basins Cliff, Scree & Badland Sparse Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | Littleleaf Mountain-Mahogany (417) | Shiflet 1994 |  |
| >< | Pinyon - Juniper: 239 | Eyre 1980 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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\*References [Required if used in text]:

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Nachlinger, J. L., and G. A. Reese. 1996. Plant community classification of the Spring Mountains National Recreation Area, Clark and Nye counties, Nevada. Unpublished report submitted to USDA Forest Service, Humboldt-Toiyabe National Forest, Spring Mountains National Recreation Area, Las Vegas, NV. The Nature Conservancy, Northern Nevada Office, Reno, NV. 85 pp. plus figures and appendices.

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Welsh, S. L. 1979. Endangered and threatened plants of Utah: A case study. Great Basin Naturalist Memoirs 3:64-80.

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4. Polar & High Montane Scrub, Grassland & Barrens

Tundra, alpine and tropical high montane habitats dominated by cryomorphic growth forms (including *dwarf-shrubs*, krummholz, associated *herbs, lichens* and *mosses*), with low height and open to closed canopy.

4.A. Tropical High Montane Scrub & Grassland

Tropical High Montane Scrub & Grassland is dominated by herbaceous perennials and small-leaved low woody shrubs or small sub-woody species in high tropical mountains, where freezing and cryogenic processes occur. It occurs in all tropical high mountains worldwide, where it occupies the sub-nival elevations.

4.A.1. Tropical High Montane Scrub & Grassland

Tropical High Montane Scrub & Grassland is dominated by herbaceous perennials and small-leaved low woody shrubs or small sub-woody species in high tropical mountains, where freezing and cryogenic processes occur. They occur in all tropical high mountains, where they occupy the sub-nival altitudinal belt, generally above 4500 m altitude in the Andes.

4. Polar & High Montane Scrub, Grassland & Barrens

4.A.1.Eg. Tropical & Mediterranean Andean High Montane Scrub & Grassland

D298. Tropical & Mediterranean Andean High Montane Scrub & Grassland

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 4.A.1.Eg. Tropical High Montane Scrub & Grassland (F022)

Elcode: D298

\*Scientific Name: Tropical & Mediterranean Andean High Montane Scrub & Grassland Division

\*Common (Translated Scientific) Name: Tropical & Mediterranean Andean High Montane Scrub & Grassland Division

\*Colloquial Name: Tropical & Mediterranean Andean High Montane Scrub & Grassland

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M869 | Andean High Montane Cliff, Scree & Rock Vegetation |
| M794 | High Andean Xeric Puna Bunch Grassland |
| M793 | High Andean Moist Puna Bunch Grassland |
| M792 | High Northern Andean Super-Paramo |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-03 | D056 Andean High Montane Cliff, Scree & Rock Vegetation Division | D056 concept covered by D298 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

4. Polar & High Montane Scrub, Grassland & Barrens

4.A.1.Eg. Tropical & Mediterranean Andean High Montane Scrub & Grassland

M794. High Andean Xeric Puna Bunch Grassland

Type Concept Sentence: Grass and scrub communities of the xeric Andean plateau and mountains, growing above 3000 m elevation in Bolivia, southwestern Peru, northern Chile, and northwestern Argentina. Open scrubs dominated by evergreen species of *Parastrephia* cover extensive areas. Also includes grass and forb communities occurring further south on the Andean slopes of central Chile and Argentina and growing above 2500 m with dry Mediterranean climates. Here, diagnostic Mediterranean elements belong to the genera *Adesmia, Fabiana, Mulinum*, and *Artemisia*. Communities growing on stony mineral soils form an open, short shrubland with the diagnostic species *Anarthrophyllum gayanum, Laretia acaulis*, and *Discaria prostrata*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 4.A.1.Eg. Tropical & Mediterranean Andean High Montane Scrub & Grassland (D298)

Elcode: M794

\*Scientific Name: High Andean Xeric Puna Bunch Grassland Macrogroup

\*Common (Translated Scientific) Name: High Andean Xeric Puna Bunch Grassland Macrogroup

\*Colloquial Name: High Andean Xeric Puna Bunch Grassland

\*Type Concept: The macrogroup represents a diverse group of grass and scrub communities of the sub-humid to xeric Andean plateau and mountains, growing above 3000 m elevation in southwestern Peru, Bolivia, northern Chile and northwestern Argentina. It also includes xeromorphic communities located further south in the Andean slopes of central Chile and Argentina, growing above 2500 m elevation with sub-humid Mediterranean climate. The structure and composition of these communities is varied. In the xeric Puna region, extensive areas are dominated by the evergreen scale-leaved composite shrub *Parastrephia quadrangularis* which forms a semi-open scrub, 1-2 m tall, growing on volcanic ashes, sometimes on sandy plains, or on stony colluviums and alluviums farther south. Accompanying species of this type are *Parastrephia lepidophylla, Parastrephia phylicaeformis, Adesmia occulta, Junellia minima, Deyeuxia brevifolia, Stipa nardoides, Senecio humillimus, Festuca orthophylla, Werneria aretioides*, and *Azorella compacta*. Other communities distributed in the southern portion of the xeric Puna show a combination of grass and forbs of tropical affinity growing with elements typical of the Mediterranean Andes, such as those in the genera *Adesmia, Fabiana, Mulinum*, and *Artemisia*. In the Mediterranean high Andes of central Chile and Argentina, the vegetation growing on stony, mineral soils is formed by a semi-open shrub layer, usually thorny and short with diagnostics *Anarthrophyllum gayanum, Laretia acaulis, Haplopappus scrobiculatus, Senecio polygaloides, Adesmia subterranea, Adesmia horrida, Adesmia hemisphaerica, Junellia uniflora, Oxalis bryoides, Discaria prostrata*, and *Astragalus* spp. Communities which are seasonally covered by snow for longer periods are dominated by *Azorella cryptantha, Azorella madreporica, Azorella monantha, Adesmia subterranea, Discaria nana*, and *Stipa chrysophylla*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CL, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

4. Polar & High Montane Scrub, Grassland & Barrens

4.A.1.Eg. Tropical & Mediterranean Andean High Montane Scrub & Grassland

M793. High Andean Moist Puna Bunch Grassland

Type Concept Sentence: Grassland communities of the central Andes in Peru and Bolivia, growing above 4000 m elevation on slopes with poor, eroded soils due to landslides or the effect of periodic freezing and thawing. The vegetation is semi-open and dominated by cushion-forming species. Diagnostic species include *Aciachne* spp., *Anthochloa lepidula, Azorella* spp., *Dielsiochloa floribunda, Englerocharis peruviana, Nototriche purpurascens, Nototriche vargasii, Nototriche violacea, Pycnophyllum molle, Stangea rhizantha, Valeriana nivalis*, and *Werneria* spp. Also included are communities that grow in milder conditions with better soils and moisture availability, forming extensive short grasslands dominated by *Festuca* spp. and *Deyeuxia* spp. alternating with diverse forbs and rosulates.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 4.A.1.Eg. Tropical & Mediterranean Andean High Montane Scrub & Grassland (D298)

Elcode: M793

\*Scientific Name: High Andean Moist Puna Bunch Grassland Macrogroup

\*Common (Translated Scientific) Name: High Andean Moist Puna Bunch Grassland Macrogroup

\*Colloquial Name: High Andean Moist Puna Bunch Grassland

\*Type Concept: Plant communities of the central Andes in Peru and Bolivia, growing above 4000 m elevation on slopes with poor, eroded soils due to landslides or the effect of periodic freeze and thaw. In this conditions grows a semi-open vegetation dominated by woody and suffruticose, usually cushion-forming, camephytes. Diagnostic species are *Azorella* spp., *Werneria ciliolata, Werneria dactilophylla, Englerocharis peruviana, Anthochloa lepidula, Dielsiochloa floribunda, Valeriana nivalis, Nototriche violacea, Nototriche purpurascens, Nototriche vargasii, Nototriche* spp., *Stangea rhizantha, Pycnophyllum molle*, and *Aciachne* spp. Other communities are included which grow in milder conditions with better soils and moisture availability; these form extensive grasslands dominated by short bunchgrasses alternating with a diverse flora of forbs usually forming cushions, and rosulate camephytes, currently heavily influenced by grazing. Diagnostic species of this community are *Festuca dolichophylla, Festuca rigescens, Deyeuxia vicunarum, Deyeuxia minima, Deyeuxia* spp., *Azorella diapensioides, Azorella biloba, Azorella multifida, Luzula racemosa, Stipa hans-meyeri, Stipa brachyphylla, Baccharis alpina, Erigeron rosulatus, Poa gymnantha, Poa candamoana, Scirpus rigidus, Paranephelius ovatus*, and *Gomphrena meyeniana*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

4. Polar & High Montane Scrub, Grassland & Barrens

4.A.1.Eg. Tropical & Mediterranean Andean High Montane Scrub & Grassland

M792. High Northern Andean Super-Paramo

Type Concept Sentence: Open shrublands of the northern Andes in Venezuela, Colombia and Ecuador, occurring above 3800-4000 m elevation on slopes or glacial valleys. Shrubs reach up to 1 m in height. A lower vegetation layer is formed by tussock grasses and associated pulvinate plants. Characteristic grassland species are *Agrostis araucana, Agrostis* spp., *Carex pichinchensis, Deyeuxia recta, Festuca* spp., *Lachemilla nivalis, Luzula racemosa*, and *Werneria humilis*. Typical shrubs include *Arcytophyllum nitidum, Brachyotum strigosum, Chuquiraga jussieui, Gaylussacia buxifolia, Hypericum laricifolium, Loricaria colombiana, Loricaria ferruginea, Lupinus microphyllus, Pernettya* spp., *Senecio canescens, Senecio comosus, Vaccinium* spp., and cushion-forming plants. In Venezuela and Colombia, subshrubs of *Cospeletia lutescens, Coespeletia timotensis, Espeletia moritziana*, and *Espeletia semiglobulata* are common.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 4.A.1.Eg. Tropical & Mediterranean Andean High Montane Scrub & Grassland (D298)

Elcode: M792

\*Scientific Name: High Northern Andean Super-Paramo Macrogroup

\*Common (Translated Scientific) Name: High Northern Andean Super-Paramo Macrogroup

\*Colloquial Name: High Northern Andean Super-Paramo

\*Type Concept: Plant communities of the northern Andes in Venezuela, Colombia and Ecuador, growing above 3800-4000 m elevation on slopes or on slightly undulated terrain commonly corresponding to glacial valleys or moraines, in humid to very humid climate. These are open shrublands up to 1 m high, with a lower layer of grassland formed by rhizomatous, tussock grasses and associated pulvinate plants. Characteristic species are *Agrostis araucana, Agrostis* spp., *Carex pichinchensis, Deyeuxia recta, Festuca breviaristata, Festuca dolichophylla, Lachemilla nivalis, Werneria humilis, Luzula racemosa, Lachemilla pinnata*, and *Acaulimalva purdiei*. Among accompanying shrubs, which can also occur forming open shrublands alternating with patches of bare rocky soils, are *Chuquiraga jussieui, Loricaria ferruginea, Loricaria colombiana, Arcytophyllum nitidum, Brachyotum strigosum, Gaylussacia buxifolia, Hypericum laricifolium, Diplostephium* spp., *Lachemilla nivalis, Lupinus microphyllus, Pernettya prostrata, Pernettya hirta, Vaccinium* spp., *Senecio canescens, Senecio comosus*, and cushion-forming plants *Valeriana pilosa, Valeriana plantaginea, Calandrinia acaulis, Arenaria* spp., *Werneria* spp., *Pentacalia gelida, Aciachne flagellifera, Aciachne pulvinata, Azorella* spp., *Draba* spp., and *Astragalus geminiflorus*. In Venezuela and Colombia subshrubs of *Cospeletia lutescens, Espeletia moritziana, Espeletia semiglobulata*, and *Coespeletia timotensis* are common.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC, PE, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

4.B. Temperate to Polar Alpine & Tundra Vegetation

Alpine dwarf-shrublands, krummholz, forb meadows, grasslands, and cryptogam barrens occurring above treeline in temperate and boreal regions around the globe, predominantly in North America and Eurasia, with more isolated occurrences in the Southern Hemisphere. Polar tundra is dominated by dwarf-shrubs, cushion shrubs, sedges and grasses, mosses and lichens, and is found in the high latitudes north of 60°N in the Arctic region and south of 50°S in the Antarctic region, in permafrost soils that range from dry to seasonally saturated.

4.B.1. Temperate & Boreal Alpine Tundra

Alpine dwarf-shrublands, forb meadows and grasslands occurring above the continuous forest line in temperate and boreal regions around the globe, predominantly in North America and Eurasia, with more isolated occurrences in the Southern Hemisphere.

4. Polar & High Montane Scrub, Grassland & Barrens

4.B.1.Eg. Southern Andean High Montane Tundra

D299. Southern Andean High Montane Tundra

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 4.B.1.Eg. Temperate & Boreal Alpine Tundra (F037)

Elcode: D299

\*Scientific Name: Southern Andean High Montane Tundra Division

\*Common (Translated Scientific) Name: Southern Andean High Montane Tundra Division

\*Colloquial Name: Southern Andean High Montane Tundra

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M795 | Southern Andean Alpine Tundra |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

4. Polar & High Montane Scrub, Grassland & Barrens

4.B.1.Eg. Southern Andean High Montane Tundra

M795. Southern Andean Alpine Tundra

Type Concept Sentence: Grassland and shrubland communities growing from 1200 to 1800 m elevation in the temperate, humid southern Andes of Argentina and Chile. They are dominated by the semi-prostrate evergreen shrub *Empetrum eamesii*, which forms large "carpets" accompanied by other shrubs (some of which are cushion-forming) and tussock grasses. These species include *Acaena magellanica, Adesmia parviflora, Azorella incisa, Berberis empetrifolia, Festuca monticola, Gaultheria caespitosa, Oreopolus glacial, Pernettya pumila, Quinchamalium andinum, Senecio magellanicus*, and *Viola reichei*. This community alternates with *Nothofagus pumilio* deciduous forests and replaces them under disturbed conditions.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 4.B.1.Eg. Southern Andean High Montane Tundra (D299)

Elcode: M795

\*Scientific Name: Southern Andean Alpine Tundra Macrogroup

\*Common (Translated Scientific) Name: Southern Andean Alpine Tundra Macrogroup

\*Colloquial Name: Southern Andean Alpine Tundra

\*Type Concept: This macrogroup represents the grassland and shrubland communities growing above 1200 m and up to 1800 m elevation in the temperate, humid, southern Andes of Argentina and Chile. They are dominated by the semi-prostrate, evergreen shrub *Empetrum eamesii (= Empetrum rubrum)* which forms large "carpets" accompanied by other shrubs, some of them cushion-forming, and tussock grasses. Among these species are *Gaultheria caespitosa, Pernettya pumila, Berberis empetrifolia, Azorella incisa, Acaena magellanica, Festuca monticola, Quinchamalium andinum, Senecio magellanicus, Viola reichei, Adesmia parviflora*, and *Oreopolus glacial*. This community alternates with deciduous forests of *Nothofagus pumilio* and replaces them under disturbed conditions.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

4. Polar & High Montane Scrub, Grassland & Barrens

4.B.1.Eh. Magellanian High Montane Tundra

D300. Magellanian High Montane Tundra

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 4.B.1.Eh. Temperate & Boreal Alpine Tundra (F037)

Elcode: D300

\*Scientific Name: Magellanian High Montane Tundra Division

\*Common (Translated Scientific) Name: Magellanian High Montane Tundra Division

\*Colloquial Name: Magellanian High Montane Tundra

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M796 | Magellanian Montane Tundra |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

4. Polar & High Montane Scrub, Grassland & Barrens

4.B.1.Eh. Magellanian High Montane Tundra

M796. Magellanian Montane Tundra

Type Concept Sentence: Communities growing at the highest elevation of the temperate southern Andes in Argentina and Chile, or an extreme substrates. The most extensive example is a bunch grassland growing on shallow, well-drained soils dominated by *Baccharis nivalis, Elymus andinus, Erigeron myonites, Festuca gracillima, Festuca monticola, Hierochloe juncifolia, Poa fueguina*, and *Senecio trifurcatus*. Small-patch communities restricted to soils that experience solifluction are dominated by *Adesmia parviflora* and *Perezia megalantha*. Also included are the communities restricted to rocky outcrops and stony, steep slopes where typical species include *Baccharis nivalis, Berberis empetrifolia, Discaria chacaye, Nassauvia lagascae, Senecio subdiscoideus*, and *Senecio subumbellatus*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 4.B.1.Eh. Magellanian High Montane Tundra (D300)

Elcode: M796

\*Scientific Name: Magellanian Montane Tundra Macrogroup

\*Common (Translated Scientific) Name: Magellanian Montane Tundra Macrogroup

\*Colloquial Name: Magellanian Montane Tundra

\*Type Concept: This macrogroup includes those communities growing at the highest elevation of the temperate southern Andes in Argentina and Chile, and/or under extreme conditions mainly in terms of substrate. The most extended one is a dense to semi-open bunch grassland growing on shallow, well-drained soils dominated by *Hierochloe juncifolia, Poa fueguina, Elymus andinus, Festuca monticola, Festuca gracillima, Bolax gummifera, Baccharis nivalis, Senecio trifurcatus*, and *Erigeron myonites*. Small-patch communities restricted to soils that experience solifluction are interspersed with the grasslands and are dominated by *Adesmia parviflora* and *Perezia megalantha*. Also included are the communities restricted to rock outcrops and stony, steep slopes, dominated by woody and suffruticose camephytes with *Baccharis nivalis, Senecio subdiscoideus, Nassauvia lagascae, Leucheria hannii, Discaria chacaye, Berberis empetrifolia, Senecio subumbellatus*, and *Caltha apendiculata* as diagnostic species.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, CL

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

4. Polar & High Montane Scrub, Grassland & Barrens

4.B.1.Na. Eastern North American Alpine Tundra

D042. Eastern North American Alpine Tundra

Type Concept Sentence: This alpine vegetation occurs near or above treeline extending into subalpine, on mountain ridges and summits within the northern temperate and boreal areas of eastern North America, south of the continental (arctic) treeline, where wind, low mean annual temperatures or limited growing days, and cloud cover limit the length of the growing season for plants.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 4.B.1.Na. Temperate & Boreal Alpine Tundra (F037)

Elcode: D042

\*Scientific Name: *Vaccinium uliginosum - Vaccinium vitis-idaea - Diapensia lapponica* Alpine Tundra Division

\*Common (Translated Scientific) Name: Bog Blueberry - Lingonberry - Pincushion Plant Alpine Tundra Division

\*Colloquial Name: Eastern North American Alpine Tundra

\*Type Concept: This alpine vegetation occurs near or above treeline, extending into subalpine, on mountain ridges and summits within the northern temperate and boreal areas of eastern North America, south of the continental (arctic) treeline, where wind, low mean annual temperatures or limited growing days, and cloud cover limit the length of the growing season for plants. Physiognomy is variable and is limited to growth forms that are well-adapted to conditions of a short growing season, high and/or constant winds, and extreme winter cold. These include dwarf-shrublands, saxicolous lichens, subalpine krummholz (dwarfed trees and taller shrubs), alpine cushion plants, and alpine graminoid meadows. Diagnostic species include *Agrostis mertensii, Arctostaphylos alpina, Arnica lanceolata, Betula glandulosa, Carex bigelowii, Castilleja septentrionalis, Diapensia lapponica , Euphrasia oakesii, Geum peckii, Harrimanella hypnoides, Anthoxanthum monticola, Huperzia appalachiana, Juncus trifidus, Loiseleuria procumbens, Minuartia groenlandica, Omalotheca supina, Oxyria digyna, Phleum alpinum, Phyllodoce caerulea, Polygonum viviparum, Prenanthes boottii, Rhododendron lapponicum, Salix herbacea, Salix uva-ursi, Saxifraga foliolosa, Sibbaldia procumbens, Silene acaulis, Solidago cutleri, Trichophorum cespitosum, Vaccinium uliginosum, Vaccinium vitis-idaea, Veronica wormskjoldii* and/or with *Abies balsamea* or *Picea mariana* in krummholz form. This type occurs (1) in isolated regions of the Laurentian (Canadian) Shield, including the Adirondack Mountains, (2) in the northern Appalachian Mountains, including the Green and White mountains, the Monts Chic-Chocs and McGerrigle, and the Long Range, and (3) on isolated lower elevation coastal and inland summits, from southern New Hampshire to northern Quebec and Labrador.

\*Diagnostic Characteristics: Shrub, dwarf-shrub, herbaceous, or lichen vegetation growing near or above treeline elevations, in boreal or temperate eastern North America, usually with one or more of these diagnostic species: *Agrostis mertensii, Arctostaphylos alpina, Arnica lanceolata, Betula glandulosa, Carex bigelowii, Castilleja septentrionalis, Diapensia lapponica , Euphrasia oakesii, Geum peckii, Harrimanella hypnoides, Anthoxanthum monticola ssp. monticola, Huperzia appalachiana, Juncus trifidus, Loiseleuria procumbens, Minuartia groenlandica, Omalotheca supina, Oxyria digyna, Phleum alpinum, Phyllodoce caerulea, Polygonum viviparum, Prenanthes boottii, Rhododendron lapponicum, Salix herbacea, Salix uva-ursi, Saxifraga foliolosa, Sibbaldia procumbens, Silene acaulis, Solidago cutleri, Trichophorum cespitosum, Vaccinium uliginosum, Vaccinium vitis-idaea, Veronica wormskjoldii* and/or with *Abies balsamea* or *Picea mariana* in krummholz form.

\*Classification Comments: This division includes both true alpine areas (i.e., those that have species and growth forms that are also characteristic of arctic tundra), and subalpine areas (i.e., areas of lower elevations that support dwarf or krummholz trees and exposure-induced heath shrublands). The subalpine areas have a more limited subset of the arctic species, and these often are mixed with low-elevation boreal or subboreal species.

The floristic and a more precise environmental/geographic distinction between this division and 4.B.2.Xa ~Arctic Tundra & Barrens Division (D044)$$ is also needed. For lack of comprehensive floristic information across the gradients of the two divisions, the current geographic boundary is placed at the continental treeline in northern Quebec and Labrador. While somewhat imprecise geographically, this distinction has some conceptual logic, as stands of arctic/alpine vegetation become progressively more insular and isolated from continental tundra to the south, beginning at this location. Presumably, arctic species would progressively be lost from the flora and endemic high-montane alpine species and occasional northern temperate zone species would be progressively more likely to be components of the vegetation.

The potentially high overlap in species composition between this division and 4.B.2.Xa ~Arctic Tundra & Barrens Division (D044)$$, as intimated by the 70% overlap in species between arctic species and alpine regions of the Presidential Range in New Hampshire (Billings 1988), may suggest that North American temperate and boreal alpine vegetation should not be distinguished from arctic vegetation at the formation and division levels. This issue will need further review after all divisions are characterized across North America.

This division presently includes alpine saxicolous lichen and sparse vascular plant communities within ~Eastern Alpine Cliff, Scree & Rock Vegetation Group (G108)$$, including on cliffs and boulderfields (felsenmeer).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D024 | Eastern North American Grassland & Shrubland |  |
| D043 | Western North American Alpine Tundra |  |
| D044 | Arctic Tundra & Barrens |  |

Similar NVC Types General Comments [optional]: This division (D042) presently is distinguished from 4.B.2.Xa ~Arctic Tundra & Barrens Division (D044)$$, somewhat arbitrarily, by its occurrence south of the continental treeline in Labrador and Quebec. Vegetation of the Torngat, Kiglapait, and Kaumajet mountains, which rise from sea-level tundra in northern Labrador (Jones and Willey 2012a) is considered to be that of D044. The divisional boundary does not occur within the scope of the USNVC within eastern North America, and, for practical purposes, floristic diagnosis between the two would be necessary only within Canada. Using the data of Bliss (1963), Billings (1988) observed that 70% of the alpine species of the Presidential Range in New Hampshire also occurred in the Arctic, a much higher concurrence between alpine and arctic flora than occurs in western North America. The floristic distinction between the divisions probably lies somewhere along a north-to-south gradient of decreasing frequency of circumpolar species with increasing frequency of eastern North America alpine endemic taxa.

Stands of ~Laurentian-Acadian Acidic Rocky Scrub & Grassland Macrogroup (M505)$$ within 2.B.2.Nc ~Eastern North American Grassland & Shrubland Division (D024)$$ may appear similar in physiognomy to those of this division (D042) and they occupy edaphically similar settings. Generally, vegetation of the latter can be diagnosed by the presence of [usually, multiple] species that also occur in the alpine (e.g., *Empetrum nigrum, Huperzia appalachiana (= Huperzia appressa), Juncus trifidus, Minuartia groenlandica, Trichophorum cespitosum, Vaccinium uliginosum*, and/or *Vaccinium vitis-idaea*) and/or of subboreal to boreal heath (e.g., *Kalmia angustifolia, Ledum groenlandicum*) and/or tree species (*Abies balsamea, Betula papyrifera var. cordifolia, Picea mariana*) and by the non-importance or absence of more strictly temperate species (e.g., *Danthonia spicata, Gaylussacia baccata, Pinus strobus, Quercus rubra, Vaccinium pallidum*). Within the latitudinal scope of the U.S., D042 is limited to elevations above 830 m (2700 feet) in elevation, except near the Atlantic Coast, whereas M505 occurs generally below that elevation.

VEGETATION

Physiognomy and Structure Summary: This vegetation includes physiognomically variable vegetation, including shrublands of wind-stunted (krummholz) coniferous and, hardwood trees and heaths to tundra-like dwarf-shrublands, graminoid meadows, and cushion plant communities to lichen-dominated lithomorphic communities with sparse vascular plants.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Subalpine krummholz communities are dominated mostly by the conifers *Abies balsamea* and/or *Picea mariana*, and, less frequently, by deciduous species such as *Alnus viridis, Betula papyrifera var. cordifolia (= Betula cordifolia)*, and *Betula glandulosa*. At lower elevations, *Amelanchier bartramiana, Kalmia angustifolia, Ledum groenlandicum (= Rhododendron groenlandicum), Ilex mucronata (= Nemopanthus mucronatus), Rhododendron canadense, Vaccinium angustifolium*, and/or dwarfed *Picea rubens* may be important. *Larix laricina* (mostly on serpentine) and *Picea glauca* can be krummholz components, mostly in the Canadian part of the range. Frequent and widespread species across both the alpine and subalpine zones include the dwarf-shrubs *Empetrum nigrum, Sibbaldiopsis tridentata, Vaccinium uliginosum*, and *Vaccinium vitis-idaea* and the herbs *Carex brunnescens, Huperzia appalachiana (= Huperzia appressa), Juncus trifidus, Minuartia groenlandica*, and *Trichophorum cespitosum*. Dwarf-shrubs that are more-or-less restricted to the true alpine zones include *Arctostaphylos alpina (= Arctous alpina), Betula minor, Diapensia lapponica, Harrimanella hypnoides (= Cassiope hypnoides), Loiseleuria procumbens, Phyllodoce caerulea, Rhododendron lapponicum, Salix argyrocarpa, Salix herbacea*, and *Salix uva-ursi*. Typical alpine herbs include *Agrostis mertensii, Arnica lanceolata, Carex bigelowii, Castilleja septentrionalis, Euphrasia oakesii, Geum peckii, Anthoxanthum monticola, Phleum alpinum, Polygonum viviparum (= Bistorta vivipara), Prenanthes boottii (= Nabalus boottii), Saxifraga foliolosa (= Micranthes foliolosa*), and *Solidago cutleri (= Solidago leiophylla*). Species such as *Cardamine bellidifolia, Omalotheca supina, Oxyria digyna, Salix arctophila, Sibbaldia procumbens, Silene acaulis*, and *Veronica wormskjoldii* are infrequent to rare in the U.S. part of the range, but more frequent in Canadian stands. *Empetrum eamesii, Epilobium hornemannii*, and *Paronychia argyrocoma* are, more-or-less, restricted to subalpine areas. Some herbs that are common at lower elevations that also range into the alpine zone include *Calamagrostis canadensis, Clintonia borealis, Cornus canadensis, Coptis trifolia, Deschampsia flexuosa, Geocaulon lividum, Solidago macrophylla, Trientalis borealis*, and *Veratrum viride*. The fruticose lichens *Alectoria ochroleuca, Cetraria* spp., *Cladonia* spp., and *Thamnolia vermicularis* and the moss *Polytrichum juniperinum* are typical of alpine areas.

On limestone substrates (all in the Canadian part of the range), *Arabis alpina, Draba* spp., *Dryas drummondii, Dryas integrifolia, Saxifraga aizoides, Saxifraga caespitosa, Saxifraga paniculata*, and/or *Silene acaulis* may occur (Jones and Willey 2012a). On ophiolite (serpentine) substrates (all in the Canadian part of the range), *Arenaria humifusa, Armeria maritima, Cirsium muticum, Juniperus communis, Minuartia marcescens, Minuartia rubella, Salix glauca, Silene acaulis*, and/or *Silene suecica* may be present (Jones and Willey 2012a).

On rock outcrops or boulderfields (felsenmeer), saxicolous lichens dominate. Typical species include *Arctoparmelia centrifuga, Ochrolechia frigida, Rhizocarpon geographicum*, and *Umbilicaria hyperborea*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Communities tend to remain spatially stable over time, with weather and climate conditions imposing uniformly limiting conditions on plant growth. Within this climate, relatively small topographic variation produces variation in snow depth, which is negatively associated with wind exposure. In turn, this environmental gradient produces variation in plant communities from cushion plant communities on the most exposed sites to graminoid meadows and dwarf-shrublands in sites of intermediate exposure to snowbank shrub- and forb-dominated communities or krummholz in the most protected areas with deeper snow cover.

ENVIRONMENT

Environmental Description: This vegetation is restricted to exposed areas on summits or ridges near or above treeline. Elevation varies with relative exposure and tends to be lower on isolated summits and nearer the Atlantic Coast. This may be because clouds or fog favor the development of this vegetation over drier stands, such as those of ~Laurentian-Acadian Acidic Rocky Scrub & Grassland Macrogroup (M505)$$ within 2.B.2.Nc ~Eastern North American Grassland & Shrubland Division (D024)$$. At the lowest latitudes in the range of the division, the lower elevation of inland stands can be as low as about 830 m (2700 feet) on individual summits (e.g., Mount Monadnock, New Hampshire) to about 1510 m (4900 feet) on more extensive ridges (e.g., Presidential Range, New Hampshire). The lower elevation can be at least as low as 466 m in coastal areas of Maine and Nova Scotia (Jones and Willey 2012a). The lower range of the elevation decreases with increasing latitude and may be as low as 100 m in coastal Labrador (Jones et al. 2012b). The highest elevation reached by this vegetation is 1935 m (6288 feet).

*Climate:* The average annual temperature at the summit of Mount Washington, New Hampshire, is -3°C (27 °F). Average annual precipitation is 38 cm (97 inches) and precipitation is relatively evenly distributed throughout the year. Average annual snowfall is 111 cm (282 inches), with significant snow from October to May. About 30 frost-free days occur each year, and there are about 4-5 months during which the mean temperature is more than 0°C (32°F) (Billings 1988). Winds may be sustained at more than 160 km/hour (100 mph). Subalpine areas within the same latitudinal region as Mount Washington experience somewhat warmer and less windy, but still moderately severe, growing conditions for plants.

*Soils/substrate:* Soils are usually shallow, very rocky, and susceptible to movement from rapid freeze-thaw cycles. Most would probably be characterized as Inceptisols. They have mostly rapid drainage, with some moderately poor drainage in snowbank areas. Most areas occupied by vegetation of this division, and all areas within the United States are underlain by felsic igneous or metamorphic rocks (e.g., granites, schists, gneisses). Areas of the Monts Chic-Chocs on the Gaspe Peninsula of Quebec and more extensive areas in the western Newfoundland mountains also are underlain by mafic (serpentine) or calcareous (limestone) geology, and the floristic patterns vary from that of the relatively homogeneous patterns of the felsic substrates (Jones and Willey 2012a, Jones et al. 2012c, 2012d).

*Biogeography:* The division occupies very small, climatically unique areas within the Canadian [floristic] Province and the Labradoran Subprovince of the Cordilleran-Arctic Province of McLaughlin (2007).

DISTRIBUTION

\*Geographic Range: This division is distributed as small patches within a matrix of temperate or boreal forest or woodlands in the northern Appalachian Mountains and the Adirondack and Canadian Shield, from northern New England (e.g., Mount Monadnock, New Hampshire) and New York (Adirondack Mountains) to northern Quebec and Labrador (e.g., the Mealy Mountains). The range includes the Canadian (Laurentian) Shield, the northern Appalachian Mountains, and isolated coastal mountains and hills. Some of the better known areas that support this vegetation, including both subalpine and alpine stands, include the Presidential Range and Franconia Ridge in New Hampshire, Mount Katahdin in Maine, Monts Chic-Chocs (Mont Albert) and McGerrigle (Mont Jacques-Cartier) in Quebec, and the Long Range Mountains of Newfoundland. A number of specific locations are given by Jones and Willey (2012a).

Nations: CA, US

States/Provinces: LB, ME, NB, NF, NH, NS, NY, QC, VT

USFS Ecoregions (2007) [optional]: M211:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]: As defined, this vegetation is restricted to alpine areas within the boreal and temperate zones of eastern North America, where it is relatively disjunct from all similar vegetation; therefore, confidence in the concept itself is high. However, uncertainty remains about the specifics of this conceptual boundary with that of arctic tundra.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M131 | Eastern North American Alpine Tundra |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Alpine and subalpine communities | Sperduto and Kimball 2011 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: D. Sperduto and B. Kimball (2011)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Lea

Acknowledgments [optional]: The description incorporated floristic information from macrogroup descriptions as provided by Sue Gawler and Don Faber-Langendoen. Jones and Willey (2012b) provided much information on floristic patterns in Canada.

Version Date: 28 Oct 2015

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4. Polar & High Montane Scrub, Grassland & Barrens

4.B.1.Na. Eastern North American Alpine Tundra

M131. Eastern North American Alpine Tundra

Type Concept Sentence: This dwarf-shrub-, herb-, or lichen-dominated vegetation occurs above treeline on northeastern mountains of North America, where wind, snow, low mean annual temperatures (or limited growing degree days), and cloud cover limit plant growth. Sites encompass the ancient and weathered summits and plateaus of the Canadian Shield, Canadian maritime provinces, and the northern Appalachian Mountains. Most of the vegetation is dwarf-shrubland or lichen-dominated; islands of taller shrubs or small graminoid meadows may occur in protected spots. The dominant plants are ericads: *Vaccinium uliginosum* is diagnostic and often dominant, and *Vaccinium vitis-idaea* is often common.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 4.B.1.Na. Eastern North American Alpine Tundra (D042)

Elcode: M131

\*Scientific Name: Eastern North American Alpine Tundra Macrogroup

\*Common (Translated Scientific) Name: Eastern North American Alpine Tundra Macrogroup

\*Colloquial Name: Eastern North American Alpine Tundra

\*Type Concept: This dwarf-shrub-, herb-, or lichen-dominated vegetation occurs above treeline on northeastern mountains of North America, where wind, snow, and cloud-cover fog limit plant growth. Sites encompass the ancient and weathered summits and plateaus of the Canadian Shield, Canadian maritime provinces, and the northern Appalachian Mountains. Most of the cover is dwarf-shrubland or lichen-dominated; islands of taller shrubs or small graminoid meadows may occur in protected spots. The dominant plants are ericads: *Vaccinium uliginosum* is diagnostic and often dominant; *Vaccinium vitis-idaea* and, less often, *Vaccinium boreale*, is often common. Other alpine-restricted heaths such as *Arctostaphylos alpina, Loiseleuria procumbens, Phyllodoce caerulea*, and *Rhododendron lapponicum* are present, with composition generally varying by microsite characteristics. Other low shrubs include dwarf birches, alders and willows, such as *Alnus viridis, Betula glandulosa, Betula minor, Salix argyrocarpa, Salix herbacea*, and *Salix uva-ursi*. *Diapensia lapponica* is a characteristic cushion-plant, especially in highly exposed flats. *Carex bigelowii* is a characteristic and locally dominant sedge, *Agrostis mertensii* and *Anthoxanthum monticola ssp. alpinum* are characteristic grasses, and *Juncus trifidus* is a dominant rush. Forbs are comparatively scarce (except in snowbank settings), with characteristic species including *Minuartia groenlandica, Prenanthes boottii, Solidago cutleri*, and in a few locations, *Geum peckii* and *Potentilla robbinsiana*. In Atlantic Canada, some alpine forbland/grassland is characterized by alpine plants such as *Festuca altaica, Juncus trifidus, Luzula spicata, Polygonum viviparum*, and other (boreal) plants.

\*Diagnostic Characteristics: Alpine dwarf-shrub and herbaceous vegetation of the region's highest elevations above treeline, with one or more of these diagnostic species: *Agrostis mertensii, Arctostaphylos alpina, Betula glandulosa, Carex bigelowii, Diapensia lapponica, Geum peckii, Harrimanella hypnoides, Loiseleuria procumbens, Phyllodoce caerulea, Prenanthes boottii, Rhododendron lapponicum, Salix herbacea, Salix uva-ursi*, and *Solidago cutleri*; *Vaccinium uliginosum* and *Juncus trifidus* are typical and often dominant.

\*Classification Comments: This macrogroup differs from ~Laurentian-Acadian Acidic Scrub & Grassland Group (G788)$$ in ~Laurentian-Acadian Acidic Rocky Scrub & Grassland Macrogroup (M505)$$ in being primarily above treeline and in the presence of alpine-restricted species. In the southern part of its range, it is typically above 1220 m (4000 feet), but elevational limits change with latitude and aspect. In addition, there are many open summits in Maine and New Hampshire in the range of about 1200-1500 m (4000-5000 feet) that are above treeline where *Vaccinium uliginosum* and *Juncus trifidus* are common, but the sites may or may not have the listed "alpine obligate'" species (A. Cutko pers. comm. 2012). In Cape Breton, there are "summits" above the treeline at 350 m with alpine obligates such as *Vaccinium uliginosum, Vaccinium boreale*, the herbaceous species listed above, and numerous alpine lichens and bryophytes. There a few treeless peaks in New Brunswick with alpine vegetation, but fewer species represented (S. Basquill pers. comm. 2015). A recent publication by Jones and Willey (2012) provides an excellent general overview, as well as natural history descriptions of key sites throughout the range of this type, and should be consulted when future revisions are made. In particular, Jones et al. (2012) provide an overview of the vegetation. In the northern part of its range, particularly in exposed areas near the sea, including many areas of Newfoundland and coastal Labrador, as well as at high latitude in northern Quebec and Labrador, it becomes less clear what constitutes alpine landscape (Jones and Willey 2012). The alliances described for this macrogroup include everything from the typical dwarf-shrub and graminoid communities to wet snowbeds, bogs and fens. It may be appropriate to divide ~Eastern Alpine Tundra Group (G104)$$ in this macrogroup (M131) by these broad categories, but first we need to learn how distinct the bogs and fens are in the alpine zone relative to lower elevation types. ~Eastern Alpine Cliff, Scree & Rock Vegetation Group (G108)$$ in this macrogroup contains descriptions for the lichen fell-fields and cliffs.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Vegetation is patchy, with areas of dwarf-shrub dominance (often <10 cm tall), areas of shrub-herb mixtures, and areas of lichen-encrusted rock.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: *Vaccinium uliginosum* is diagnostic and often dominant, and *Vaccinium vitis-idaea* is often common. Alpine-restricted heaths include *Arctostaphylos alpina, Loiseleuria procumbens, Phyllodoce caerulea*, and *Rhododendron lapponicum*. Other low shrubs include Alnus viridis, Betula glandulosa, Betula minor, Salix argyrocarpa, Salix herbacea, and *Salix uva-ursi*. *Diapensia lapponica* is a characteristic cushion-plant, especially in highly exposed flats. *Carex bigelowii* is a characteristic and locally dominant sedge, *Agrostis mertensii* and *Anthoxanthum monticola ssp. alpinum (= Hierochloe alpina)* are characteristic grasses, and *Juncus trifidus* is a dominant rush. Forbs include *Solidago cutleri, Minuartia groenlandica, Prenanthes boottii*, and in a few locations *Geum peckii* and *Potentilla robbinsiana*. Less frequent species that are also more-or-less restricted to this group (in eastern North America) include *Arnica lanceolata, Epilobium hornemannii, Oxyria digyna, Phleum alpinum, Polygonum viviparum (= Persicaria vivipara), Saxifraga foliolosa*, and *Veronica wormskjoldii*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: *Climate:* The climate combines north temperate day lengths with tundra-like exposure. High winds, late-melting snow, and cloud-cover fog are important factors in combination with slope, aspect and elevation. This vegetation is restricted to highly exposed areas above 1220 m (4000 feet) elevation in the southern parts of its range, but in the north, alpine areas may be contiguous with low-elevation tundra ecosystems (Jones and Willey 2012). *Soil/substrate/hydrology:* Soils are extremely limited and most vegetation is growing on bare rock or gravel with very rapid drainage.

DISTRIBUTION

\*Geographic Range: This macrogroup occupies the higher summits of the northern Appalachian Mountains, from northern New England and the Adirondacks into Canada in the Gaspé region of Quebec, Newfoundland and Labrador, and higher peaks of New Brunswick and Cape Breton, Nova Scotia.

Nations: CA, US

States/Provinces: LB, ME, NB, NF, NH, NS, NY, QC, VT

USFS Ecoregions (2007) [optional]: M211A:CC, M211B:CC, M211C:CC, M211D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: A recent publication by Jones and Willey (2012), which provides an excellent general overview of this macrogroup, as well as natural history descriptions of key sites throughout the range of this type, should be consulted when future revisions are made. In particular Jones et al. (2012) provide an overview of the vegetation.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G104 | Eastern Alpine Tundra |
| G108 | Eastern Alpine Cliff, Scree & Rock Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-08-18 | M133 Eastern Alpine Cliff, Scree & Rock Vegetation Macrogroup | M133 merged into M131. |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Diapensia | Bliss 1963 |  |
| < | Dwarf shrub heath | Bliss 1963 |  |
| < | Dwarf shrub heath - rush | Bliss 1963 |  |
| < | Sedge meadow | Bliss 1963 |  |
| < | Sedge-rush-dwarf shrub heath | Bliss 1963 |  |
| < | Snowbank | Bliss 1963 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: L.C. Bliss (1963)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S.C. Gawler and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 21 May 2015

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4. Polar & High Montane Scrub, Grassland & Barrens

4.B.1.Nb. Western North American Alpine Tundra

D043. Western North American Alpine Tundra

Type Concept Sentence: This type consists of low to dwarf-shrublands, tundra and sparse vegetation at and above upper timberline in the western North American Cordillera from the Aleutian Islands of Alaska to northern Mexico.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 4.B.1.Nb. Temperate & Boreal Alpine Tundra (F037)

Elcode: D043

\*Scientific Name: *Phyllodoce glanduliflora - Dryas* spp. - *Festuca altaica* Alpine Tundra Division

\*Common (Translated Scientific) Name: Yellow Mountain-heath - Mountain-avens species - Altai Fescue Alpine Tundra Division

\*Colloquial Name: Western North American Alpine Tundra

\*Type Concept: This division is found from the Alaskan mountain ranges down through the Cascade-Sierras of California and through the Rocky Mountains into northeastern Mexico. Vegetation physiognomy ranges from sparse cushion plants to dense turf, dwarf-shrublands and krummholz. Communities vary considerably in floristic composition over the range of this type. In the northern alpine, well-vegetated tundra is typically composed of *Artemisia arctica, Carex microchaeta, Dryas integrifolia* or *Dryas octopetala, Festuca altaica, Polygonum viviparum, Salix reticulata, Silene acaulis*, and some bryophytes, such as *Aulacomnium turgidum* and *Hylocomium splendens*, and lichens, such as *Stereocaulon* spp. or *Flavocetraria nivalis*.

The "typical" central and southern Rocky Mountain alpine tundra has a sparse to moderate cover dominated by *Carex elynoides, Carex siccata, Carex scirpoidea, Carex nardina, Carex rupestris, Festuca brachyphylla, Festuca idahoensis, Geum rossii, Juncus drummondii, Kobresia myosuroides, Phlox pulvinata*, or *Trifolium dasyphyllum*. Wind-exposed ridges and saddles have species such as *Arenaria capillaris, Dryas integrifolia, Kobresia myosuroides, Luzula spicata, Minuartia obtusiloba, Oxytropis podocarpa, Paronychia pulvinata, Phlox pulvinata, Poa alpina, Potentilla nivea, Potentilla villosa, Saxifraga bronchialis, Silene acaulis, Trifolium dasyphyllum*, and *Trifolium parryi*. Dwarf-shrubland dominates the coastal alpine and snowier sites in the other areas. Common heath species are *Cassiope lycopodioides, Cassiope mertensiana, Cassiope tetragona, Empetrum nigrum, Harrimanella stelleriana, Luetkea pectinata, Phyllodoce aleutica, Phyllodoce empetriformis*, and *Phyllodoce glanduliflora*. Scattered trees and patches of krummholz may occur at lower elevations, composed of *Abies lasiocarpa, Picea glauca*, or *Tsuga mertensiana*, depending upon the area. The drier alpine vegetation of the Great Basin ranges and Sierra Nevada may include lower elevation semi-desert species such as *Carex filifolia, Poa fendleriana, Poa secunda*, and *Artemisia frigida*. The alpine of northeastern Mexico is dominated by *Potentilla leonina, Arenaria* spp., and *Thelesperma muelleri*.

Environments are varied due to climatic and site variation. Wind and its effect on snow movement has a strong local effect, producing wind-scoured fell-fields, dry turf, snow accumulation heath communities, and short growing season snowbed sites. Fell-fields are typically free of snow during the winter as they are found on ridgetops, upper slopes and exposed saddles, whereas dry turf is found on gentle to moderate slopes, flat ridges, valleys, and basins where the soil has become relatively stabilized and the water supply is more-or-less constant. Dwarf-shrubland sites tend to be in level or concave areas with late-lying snow and subirrigation from surrounding slopes. The dominant disturbances are snow avalanche, soil creep and freeze-thaw action.

\*Diagnostic Characteristics: Low to dwarf-shrublands, tundra and sparse vegetation at and above upper timberline in the western North American Cordillera from the Aleutian Islands of Alaska to northern Mexico. There are many strong diagnostic species of this type as compared to other alpine floras. These include the graminoids *Calamagrostis breweri, Carex elynoides, Carex helleri, Carex filifolia, Carex microchaeta, Carex rupestris, Festuca altaica*, and *Kobresia myosuroides*; the dwarf-shrubs *Cassiope mertensiana, Cassiope tetragona, Dryas integrifolia, Dryas octopetala, Phyllodoce empetriformis, Phyllodoce glanduliflora, Salix reticulata, Salix vestita*; and forbs such as *Artemisia arctica, Geum rossii, Phlox pulvinata, Potentilla nivea, Saxifraga bronchialis, Silene acaulis*, and *Trifolium dasyphyllum*.

\*Classification Comments: Subalpine meadows extend into the alpine but are mostly treated in 2.B.2.Na ~Western North American Grassland & Shrubland Division (D022)$$; they contain species of both the alpine and subalpine but due to their lush herbaceous growth form, they are best treated there. It appears that graminoid meadows are part of this alpine division (D043) and there may be a need to address further what meadow vegetation should be included here.

Alpine in the subarctic region of Alaska (and presumably Yukon and Northwest Territories) is included in 4.B.2.Xa ~Arctic Tundra & Barrens Division (D044)$$. There is considerable floristic similarity between subarctic alpine and boreal alpine of this division. This separation requires further assessment. Yukon combines arctic, subarctic alpine and boreal alpine at the zone level, with consideration to subzone distinction for the three regions (Flynn pers. comm. 2015). Although they lack the data to be certain of the relationship, the subarctic alpine occurs above subarctic woodland, so is more of an alpine entity than an arctic one. With that said, there are floristic similarities between arctic and alpine; e.g., even in Colorado, the alpine is considered to have about one-third species with arctic affinities.

It is somewhat debatable whether the alpine of Cerro Potosí should be included in this alpine division (D043) or combined with the zacatonal of southern Mexico. The species on this limestone mountain are mostly of a very southern distribution with only a few species providing a link to the flora of D043. However, it is considered that the alpine communities of Cerro Potosí have closer phytogeographic affinities to forb-dominated communities of the southern Rocky Mountains than with the grass-dominated, zacatonal vegetation.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D135 | Caribbean-Mesoamerican Montane & High Montane Grassland & Shrubland | includes alpine grassland (zacatonal) that is closely related to the southern extent of this division. |
| D275 | Madrean Grassland & Shrubland |  |
| D022 | Western North American Grassland & Shrubland | characterizes lower elevation grasslands and shrublands, some of which occur in and near the alpine of D043, e.g., high-montane grasslands, subalpine deciduous shrubland, avalanche tracks, and subalpine meadows. |
| D042 | Eastern North American Alpine Tundra | characterizes the alpine of eastern North America and includes eastern species such as *Carex bigelowii, Kalmia angustifolia, Harrimanella hypnoides*, and *Diapensia lapponica*, and *Picea mariana* and *Abies balsamea* compose the krummholz. |
| D044 | Arctic Tundra & Barrens |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The communities of this type are composed of sparse and open- to closed-canopy herbaceous stands, dominated by graminoids and/or perennial forbs, as well as dwarf-shrub stands, and near treeline, needle-leaved evergreen trees in krummholz form. Stands of low-statured forbs are often in cushion plant form or matted, flat to the ground in rosettes, and often densely haired and thickly cutinized. The low growth forms of alpine plants allows them to take advantage of the more favorable temperatures that occur near the ground. The height of krummholz is correlated with mean winter snow depth. Although some turf communities are extensive, the vegetation overall is a mosaic of small-patch plant communities.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Communities vary considerably in floristic composition over the range of this type. Although species vary individually in their distribution, some floristic groups are evident. Many alpine tundra species also occur in the arctic tundra, e.g., *Carex rupestris, Cassiope tetragona, Dryas integrifolia, Dryas octopetala, Kobresia myosuroides, Salix reticulata*, the proportion becoming less southward, although about one-third of the Colorado alpine flora occurs in the arctic.

In the northern alpine, the more densely vegetated tundra is composed of dwarf willows, graminoids, and forbs with bryophytes and lichens. Common species of this tundra are *Artemisia arctica, Carex microchaeta, Dryas integrifolia* (limestone-influenced soils) or *Dryas octopetala, Festuca altaica, Polygonum viviparum, Salix reticulata, Silene acaulis*, and some bryophytes, such as *Aulacomnium turgidum, Hylocomium splendens*, and *Polytrichum* spp., and lichens, such as *Stereocaulon* spp. or *Flavocetraria nivalis (= Cetraria nivalis)*.

Alpine "heath," composed of *Cassiope tetragona* and other ericaceous species, occupies sites of deeper snow. Windblown sites are sparsely vegetated with cushion or mat-forming species such as *Dryas integrifolia, Oxytropis podocarpa, Potentilla nana, Saxifraga oppositifolia, Saxifraga tricuspidata*, or *Silene acaulis*. On high alpine ridges with some snow cover, *Silene acaulis* dominates, with *Artemisia arctica, Luzula spicata, Poa alpina*, and *Polytrichum* spp. Scattered trees and patchy krummholz may occur at lower elevations, composed of species such as *Abies lasiocarpa, Picea glauca*, or *Pinus contorta*, depending upon the area.

The "typical" central and southern Rocky Mountain alpine tundra varies from sparse to moderate cover dominated by cushion plants to moderately dense to dense cover of low-growing, perennial graminoids and forbs that form a turf. Rhizomatous, sod-forming sedges are the dominant graminoids, and prostrate and mat-forming plants with thick rootstocks or taproots characterize the forbs. Dominant species include *Artemisia arctica, Carex elynoides, Carex siccata, Carex scirpoidea, Carex nardina, Carex rupestris, Festuca brachyphylla, Festuca idahoensis, Geum rossii, Juncus drummondii, Kobresia myosuroides, Phlox pulvinata*, and *Trifolium dasyphyllum*. The sparsely vegetated fell-field plants are cushioned or matted, frequently succulent, flat to the ground in rosettes, and often densely haired and thickly cutinized. Plant cover on fell-fields is 15-50%, while exposed rocks covered with crustose lichens make up the rest. They are usually found on wind-exposed ridges and saddles, within or adjacent to alpine dry turf. Common species include *Arenaria capillaris, Geum rossii, Minuartia obtusiloba, Paronychia pulvinata, Phlox pulvinata, Potentilla nivea, Potentilla villosa, Saxifraga bronchialis, Silene acaulis, Trifolium dasyphyllum*, and *Trifolium parryi*. The dwarf-shrubland "heath" of these southern areas is characterized by *Cassiope mertensiana* and *Phyllodoce empetriformis* or *Phyllodoce glanduliflora*. *Dryas octopetala*- and *Dryas integrifolia*-dominated communities occur on more windswept and drier sites than the heath communities. Dwarf willows, e.g., *Salix nivalis* or *Salix reticulata*, are often found with *Dryas*. Snowbed communities are often dominated by *Carex subnigricans* and *Sibbaldia procumbens*.

The drier alpine vegetation of the Great Basin ranges and Sierra Nevada may include lower elevation semi-desert species such as *Carex filifolia, Poa fendleriana, Poa secunda*, and *Artemisia frigida*. Other species specific to these mountains include *Aquilegia pubescens, Carex congdonii, Calamagrostis breweri, Castilleja nana, Eriogonum gracilipes, Eriogonum incanum, Phlox covillei, Podistera nevadensis*, and *Carlquistia muirii (= Raillardiopsis muirii, = Raillardella muirii)*. Alpine dwarf-shrublands are dominated or codominated by *Cassiope mertensiana, Ericameria discoidea, Kalmia microphylla, Polygonum shastense, Phyllodoce breweri, Ribes cereum, Salix arctica*, and *Vaccinium cespitosum*.

In northeastern Mexico, the alpine of Cerro Potosí in Nuevo Leon is dominated by *Potentilla leonina, Arenaria* sp., and *Bidens muelleri*. *Linum lewisii* and *Trisetum spicatum* also occur here and link this alpine region to this type. *Pinus hartwegii* is the treeline species in this area.

The coastal alpine is dominated by dwarf**-**shrub species, including *Cassiope lycopodioides* (Haida Gwaii), *Cassiope mertensiana, Cassiope tetragona, Empetrum nigrum, Harrimanella stelleriana, Luetkea pectinata, Phyllodoce aleutica, Phyllodoce empetriformis*, and *Phyllodoce glanduliflora*. Ericaceous species typically dominate, but sites dominated by *Salix arctica, Salix nivalis*, and *Salix reticulata* occur. Scattered tall shrubs and dwarf trees may also be present.

At the highest elevations of this division, conditions are too harsh for most vascular plants, often a combination of a short snow-free period and limited soil development (i.e., mostly rocky substrates), and the vegetation is dominated by lichens.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The dominant natural disturbances in this type are snow avalanche, soil creep and freeze-thaw action. Wind and insolation also impact strongly on vegetation development. Small mammals can be important in modifying the soil of meadows.

ENVIRONMENT

Environmental Description: This alpine division occurs at and above the upper treeline in the mountains of the Western Cordillera. These alpine areas can be extensive where the mountain ranges have considerable, contiguous area above treeline, but many alpine areas are isolated on individual mountain peaks. The elevation of upper treeline varies considerably from north to south, as low as 100 m elevation in Alaska to over 3500 m in northern Mexico. The treeline elevation is lower in wet maritime climates as compared to more continental climates at the same latitude. The heavy, deep snow of maritime areas limits the length of the growing season. Alpine vegetation is controlled by snow retention, wind desiccation, soil depth, permafrost, cryoturbation, solifluction, and a short growing season. Wind exposure has a strong impact on the type of vegetation in alpine areas. Ridgetops, windward upper slopes and exposed saddles can have little snow during the winter, due to wind-scouring. Level or concave areas and leeward slopes will have deeper snow, and in some areas the snow will not melt in most summers. Areas with late snowmelt will be composed of species adapted to a very short growing season; some of these species can initiate growth under the snow, and some are capable of surviving even when there are years of continuous snow cover.

*Climate:* This division combines high-elevation, temperate and boreal climates, including maritime and continental expressions. The high elevations result in long cold snowy winters and a very short growing season. The precipitation regime varies considerably. In the south and along the coast, it is strongly seasonal with most precipitation falling in the winter months as snow, and little precipitation in the summers. In many northern interior areas, the opposite is the case; higher precipitation occurs during the summer months. A high snowpack characterizes this environment. The higher cover of vegetation of this division occurs on slopes and depressions where snow lingers, the soil has become relatively stabilized, and the water supply is more-or-less constant. In high-snow areas, it is common for patches of snow to persist all summer.

*Soils/substrate:* Soils are typically shallow, well-drained, and stony, and can be subject to colluviation, solifluction, and cryoturbation; permafrost can occur, especially in northern areas. Substrates are variable across fell-fields, alpine turf and dwarf-shrub vegetation. Fell-field sites are generally shallow, stony, low in organic matter, and poorly developed with wind deflation (erosion) often resulting in a gravelly pavement. Alpine turf sites have deeper, more developed soils, although they may have moderately high cover of cobbles and boulders present. The dwarf-shrubland soils have become relatively stabilized, are moist but well-drained, strongly acidic, and often have substantial peat layers. Subirrigation from snowmelt can be an important source of moisture, especially as soils are often shallow in depth and with rock fragments. Rock, ice and late-persisting snow characterize considerable portions of the landscape adjacent to this type.

*Biogeography:* Latitude, elevation, and degree of continentality impact the development of vegetation in this division. The species vary considerably over the range of latitude, although, e.g., *Trisetum spicatum* occurs over most of the range of alpine from Mexico to Alaska. There are groups of species that occur within certain latitudinal bands. Alpine also forms elevational zones, where the low alpine zone has higher plant cover overall, has krummholz, and has species of the subalpine, e.g., subalpine meadows. Conversely, the highest alpine zone is sparsely vegetated, with more rock, ice and snow patches, and a prevalence of lichen communities on the rock. Maritime alpine is dominated by heath vegetation; whereas alpine under more of a continental influence has a greater graminoid and forb component, as well as dwarf-shrubs such as *Dryas* spp. or *Salix* spp. The heath communities are restricted to sites of deep snow.

DISTRIBUTION

\*Geographic Range: This type occurs above upper timberline in the mountains of the western North American Cordillera, including the Brooks and Alaska ranges in Alaska, the MacKenzie Mountains of Yukon and western Northwest Territories, from there southward in the Coast, Cascade and Rocky Mountain ranges and the Sierra Nevada, culminating in the Sierra Madres of Mexico and Guatemala.

Nations: CA, MX, US

States/Provinces: AB, AK, AZ, BC, CA, CO, ID, MT, MXNU, NM, NT, NV, OR, UT, WA, WY, YT

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M099 | Rocky Mountain-Sierran Alpine Tundra |
| M101 | Vancouverian Alpine Tundra |
| M404 | Western Boreal Alpine Tundra |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| ? | AM Alpine Meadow | Ecosystems Working Group 1998 | Mapping unit for British Columbia alpine meadow vegetation used in broad ecosystem inventory. |
| > | AT Alpine Tundra | Ecosystems Working Group 1998 | Mapping unit for British Columbia alpine vegetation used in broad ecosystem inventory. |
| < | Alpine Tundra Zone | Pojar and Stewart 1991 | Describes alpine vegetation of British Columbia; unit precedes Coastal, Boreal and Interior alpine zones of BC. |
| > | Alpine vegetation of North America | Billings 2000 | Describes alpine vegetation of all of North America, whereas this type is for the western cordillera. |
| < | Boreal Altai Fescue Alpine Zone | MacKenzie 2005 | Describes boreal alpine vegetation of British Columbia - applicable to alpine of YT and NT. |
| < | Coastal Mountain-heather Alpine Zone | MacKenzie 2005 | Describes coastal mountain alpine vegetation of British Columbia - somewhat applicable to alpine of adjacent states (AK, WA). |
| < | Interior Mountain-heather Alpine Zone | MacKenzie 2005 | Describes continental temperate alpine vegetation of British Columbia; applicable to alpine vegetation of adjacent states/provinces (AB, ID, MT) |

AUTHORSHIP

\*Primary Concept Source [if applicable]: W.D. Billings (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Meidinger

Acknowledgments [optional]: G. Kittel, K.A. Schulz

Version Date: 29 Oct 2015

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4. Polar & High Montane Scrub, Grassland & Barrens

4.B.1.Nb. Western North American Alpine Tundra

M099. Rocky Mountain-Sierran Alpine Tundra

Type Concept Sentence: This alpine macrogroup includes sparse cushion plants to dense turf or dwarf-shrublands. It occurs at and above upper timberline in relatively dry conditions throughout the central and southern Rocky Mountains cordillera from New Mexico north into Canada and includes alpine areas in the Utah high plateaus and high ranges in the Great Basin west into the Sierra Nevada and southern and eastern Cascades and southern interior mountain ranges of British Columbia.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 4.B.1.Nb. Western North American Alpine Tundra (D043)

Elcode: M099

\*Scientific Name: *Dryas octopetala - Carex elynoides - Silene acaulis* Alpine Tundra Macrogroup

\*Common (Translated Scientific) Name: Eight-petal Mountain-avens - Blackroot Sedge - Moss Campion Alpine Tundra Macrogroup

\*Colloquial Name: Rocky Mountain-Sierran Alpine Tundra

\*Type Concept: This macrogroup occurs at and above upper timberline throughout the Rocky Mountains cordillera from New Mexico and the Sierra Nevada north into southwestern Alberta and southeastern and south-central British Columbia. Vegetation physiognomy ranges from sparse cushion plants to dense turf or dwarf-shrublands. Most fell-field plants are cushioned or matted, frequently succulent, flat to the ground in rosettes, and often densely haired and thickly cutinized. Plant cover is 15-50%, while exposed rocks with crustose lichens make up the rest. Fell-fields are usually found within or adjacent to alpine dry turf. Common species include *Arenaria capillaris, Geum rossii, Kobresia myosuroides, Minuartia obtusiloba, Myosotis asiatica, Paronychia pulvinata, Phlox pulvinata, Silene acaulis, Trifolium dasyphyllum*, and *Trifolium parryi*. The moderately dense to dense cover of low-growing, perennial graminoids and forbs include *Artemisia arctica, Carex elynoides, Carex siccata, Carex scirpoidea, Carex nardina, Carex rupestris, Festuca brachyphylla, Festuca idahoensis, Geum rossii, Juncus drummondii, Kobresia myosuroides, Phlox pulvinata*, and *Trifolium dasyphyllum*. Dwarf-shrublands are characterized by a semi-continuous layer of ericaceous dwarf-shrubs or dwarf willows less than 0.5 m in height. Dense tufts of graminoids and scattered forbs occur. *Dryas octopetala*- and *Dryas integrifolia*-dominated communities occur on more windswept and drier sites than the heath communities. Within the heath-willow communities *Cassiope mertensiana, Salix arctica, Salix reticulata, Salix vestita*, or *Phyllodoce empetriformis* can be dominant shrubs. *Ledum glandulosum, Kalmia microphylla, Phyllodoce glanduliflora*, and *Vaccinium* spp. may also be shrub associates. Snowbed communities are characterized by *Sibbaldia procumbens* and *Carex subnigricans*. Species composition overlaps across the range of this macrogroup, although there is some significant regional and local variation. The drier alpine vegetation of the Great Basin ranges and Sierra Nevada may include lower elevation semi-desert species such as *Carex filifolia, Poa fendleriana, Poa secunda*, and *Artemisia frigida*. Environments are varied due to climatic and site variation. Wind and its effect on snow movement has a strong local effect, producing wind-scoured fell-fields, dry turf, snow accumulation heath communities, and short growing season snowbed sites. Fell-fields are typically free of snow during the winter as they are found on ridgetops, upper slopes and exposed saddles, whereas dry turf is found on gentle to moderate slopes, flat ridges, valleys, and basins where the soil has become relatively stabilized and the water supply is more-or-less constant. Dwarf-shrubland sites tend to be in level or concave areas with late-lying snow and subirrigation from surrounding slopes.

\*Diagnostic Characteristics: This macrogroup includes open to closed-(shrub) canopy, herbaceous stands dominated by alpine graminoids and forbs (especially cushion plants), as well as open to closed, often evergreen (ericaceous) dwarf-shrubland stands. The vegetation occurs as a mosaic of small-patch plant communities. Stands include alpine turf and fell-fields dominated or codominated by *Antennaria* spp., *Calamagrostis breweri, Carex elynoides, Carex helleri, Carex filifolia, Carex rupestris*, and *Kobresia myosuroides* and forbs such as *Geum rossii*, especially cushion plants *Trifolium dasyphyllum* and *Phlox pulvinata* (fell-fields). Dwarf-shrublands are characterized by *Dryas octopetala* and *Dryas integrifolia, Ericameria discoidea*, on drier sites, and *Cassiope mertensiana, Salix arctica, Salix reticulata, Salix vestita*, or *Phyllodoce empetriformis* with *Ledum glandulosum, Kalmia microphylla, Phyllodoce glanduliflora*, and *Vaccinium* spp. present to codominant on more typical mesic heath communities in the northern portion of the Central Rockies.

\*Classification Comments: Alpine turf, fell-field and dwarf-shrubland are included together for several reasons. Although these types can be quite different and can have relatively abrupt boundaries in saddles, there is often a long transition on broad alpine slopes. Species composition is similar across the distribution of this macrogroup, although there is some significant regional and local variation. The generally drier and patchier alpine vegetation of the Great Basin ranges and Sierra Nevada may include lower elevation semi-desert species such as *Carex filifolia, Poa fendleriana, Poa secunda*, and *Artemisia frigida*. The dwarf-shrublands are more distinct in the mesic northern extent than in the southern and drier ranges in the Great Basin and Colorado Plateau. In the northern extent, the dwarf-shrub layers tend to be denser and characterized by distinctive alpine heath species *Cassiope mertensiana, Phyllodoce empetriformis, Salix glauca*, and *Salix reticulata*. In the southern extent, stands dominated by *Salix arctica, Salix reticulata*, or *Salix nivalis* are less distinctive and occur as patches within the alpine turf or mesic bands around snowbeds (Cooper et al. 1997). *Dryas octopetala* and *Dryas integrifolia* often occur on harsh windblown sites on dry turf, cushion plant fell-fields or unstable scree slopes, whereas the heath types of *Cassiope mertensiana, Salix reticulata*, or *Phyllodoce empetriformis* occur as snowbed or wetland communities (Cooper et al. 1997). Some of the dwarf *Salix* species, such as *Salix arctica*, form mesic patches within the larger alpine turf communities (Lewis 1970, Zwinger and Willard 1996, Cooper et al. 1997).

This macrogroup includes Mount Lassen and Mount Shasta and the eastern portion of the southern Cascades because of the relatively dry climate that does not typically form an "alpine heath" typical of stands in ~Vancouverian Alpine Tundra Macrogroup (M101)$$, except as part of snowbed or wetland communities.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M404 | Western Boreal Alpine Tundra | is relatively mesic alpine in comparison with different diagnostic species. |
| M101 | Vancouverian Alpine Tundra | is relatively mesic alpine in comparison with different diagnostic species. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is variable structurally and includes graminoid- and forb (cushion plant)-dominated, open to closed-canopy, herbaceous stands as well as stands with dwarf-shrublands. Although some turf communities are extensive, the vegetation overall is a mosaic of small-patch plant communities.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: This widespread distributed macrogroup has variable vegetation structure and composition, ranging from sparsely vegetated fell-fields to dense turf or dwarf-shrublands. Most fell-field plants are cushioned or matted, frequently succulent, flat to the ground in rosettes, and often densely haired and thickly cutinized. Plant cover on fell-fields is 15-50%, while exposed rocks covered with crustose lichens make up the rest. They are usually found on wind-exposed ridges and saddles, within or adjacent to alpine dry turf. Common species include *Arenaria capillaris, Geum rossii, Kobresia myosuroides, Minuartia obtusiloba, Myosotis asiatica, Paronychia pulvinata, Phlox pulvinata, Potentilla nivea, Potentilla villosa, Potentilla diversifolia, Saxifraga bronchialis, Silene acaulis, Trifolium dasyphyllum*, and *Trifolium parryi*. The low-growing, perennial vegetation ranges from sparse to moderate cover dominated by cushion plants to moderately dense to dense cover of low-growing, perennial graminoids and forbs forming a turf. Rhizomatous, sod-forming sedges are the dominant graminoids, and prostrate and mat-forming plants with thick rootstocks or taproots characterize the forbs. Dominant species include *Artemisia arctica, Carex elynoides, Carex siccata, Carex scirpoidea, Carex nardina, Carex rupestris, Festuca brachyphylla, Festuca idahoensis, Geum rossii, Juncus drummondii, Kobresia myosuroides, Phlox pulvinata*, and *Trifolium dasyphyllum*. Dwarf-shrubland stands are characterized by a semi-continuous layer of ericaceous dwarf-shrubs or dwarf willows which form a heath type ground cover less than 0.5 m in height. Dense tuffs of graminoids and scattered forbs occur. *Dryas octopetala*- and *Dryas integrifolia*-dominated communities occur on more windswept and drier sites than the heath communities. Dwarf willows are often found with *Dryas*, including *Salix nivalis* or *Salix reticulata*. Within the heath communities *Cassiope mertensiana* (dominates in snowier climates), *Salix arctica, Salix vestita, Phyllodoce empetriformis*, or *Phyllodoce glanduliflora* can be dominant shrubs. *Ledum glandulosum, Kalmia microphylla, Phyllodoce glanduliflora*, and *Vaccinium* spp. may also be shrub associates. Snowbed communities are also included in this macrogroup and are characterized by indicator species *Carex subnigricans* and *Sibbaldia procumbens* with *Juncus drummondii* and *Luzula piperi* common on eroding sites.

Species composition overlaps across the range of this macrogroup, although there is some significant regional and local variation. In Great Basin and Sierra Nevada stands, common species include *Aquilegia pubescens, Castilleja nana, Draba densifolia, Eriogonum incanum, Linanthus pungens (= Leptodactylon pungens), Minuartia nuttallii (= Arenaria nuttallii), Oxyria digyna, Phlox covillei*, and *Phlox pulvinata*. Characteristic graminoid species include *Carex congdonii, Calamagrostis breweri, Calamagrostis purpurascens, Carex exserta, Juncus parryi*, and *Trisetum spicatum*. Common forbs include many of the fell-field species and *Antennaria media, Arenaria kingii, Erigeron compositus, Erigeron pygmaeus, Eriogonum gracilipes, Eriogonum ovalifolium, Eriogonum roseum, Penstemon heterodoxus, Phlox covillei, Podistera nevadensis, Carlquistia muirii (= Raillardella muirii)*, and others. Alpine dwarf-shrublands are dominated or codominated by *Cassiope mertensiana, Ericameria discoidea, Kalmia microphylla, Polygonum shastense, Phyllodoce breweri, Ribes cereum, Salix arctica*, and *Vaccinium cespitosum*.

The drier alpine vegetation of the Great Basin ranges and Sierra Nevada may include lower elevation semi-desert species such as *Carex filifolia, Poa fendleriana, Poa secunda* and *Artemisia frigida*. In the northern range, meadows can be extensive at lower elevations. Key species of these meadows are *Arnica latifolia, Erigeron peregrinus, Lupinus arcticus, Senecio triangularis, Valeriana sitchensis*, and *Veratrum viride*; other species include *Carex spectabilis, Claytonia lanceolata, Erythronium grandiflorum, Pulsatilla occidentalis (= Anemone occidentalis)*, and *Trollius laxus ssp. albiflorus*. Floristic information was compiled from Baker (1980a), Bamberg (1961), Bamberg and Major (1968), Billings (2000), Cooper et al. (1997), Holland and Keil (1995), Komarkova (1976, 1980), Lewis (1970), Sawyer and Keeler-Wolf (1995, 2007), Sawyer et al. (2009), Willard (1963), and Zwinger and Willard (1996).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Vegetation in these areas is controlled by snow retention, wind desiccation, soil moisture and a short growing season. Disturbances tend to be small-scale and localized, such as by burrowing pocket gophers. Permafrost may only occur in localized areas, such as in the Canadian Rockies.

ENVIRONMENT

Environmental Description: This widespread alpine macrogroup occurs at and above the upper treeline throughout the Rocky Mountains cordillera and alpine areas of mountain ranges in Utah and Nevada, and in isolated alpine sites in the northeastern Cascades south to the Sierra Nevada. Elevations are above 3360 m in the Colorado Rockies but drop to less than 2100 m in northwestern Montana and in the mountains of into southwestern Alberta and southeastern British Columbia. Sierran Nevada stands begin around 3500 m elevation in the southern mountains and begin at approximately 2700 m in the Klamath Mountains and southern Cascade Range. This macrogroup includes wind-scoured fell-fields and dry turf and dwarf-shrublands. Fell-fields are typically free of snow during the winter as they are found on ridgetops, upper slopes and exposed saddles, whereas dry turf is found on gentle to moderate slopes, flat ridges, valleys, and basins where the soil has become relatively stabilized and the water supply is more-or-less constant. Dwarf-shrubland sites tend to be level or concave areas of glacial topography, with late-lying snow and subirrigation from surrounding slopes. Vegetation in these areas is controlled by snow retention, wind desiccation, permafrost, and a short growing season.

Climate is continental temperate, and due to the high elevations, long cold snowy winters and a very short growing season result. It is typically drier than either the Vancouverian or Boreal alpine vegetation. The precipitation regime is strongly seasonal, with most precipitation falling in the winter months as snow. Summers are mostly dry. Substrates are variable across fell-fields, alpine turf and dwarf-shrub vegetation. Fell-field sites are generally shallow, stony, low in organic matter, and poorly developed with wind deflation often resulting in a gravelly pavement. Alpine turf sites have deeper, more developed soils, although there may have moderately high cover of cobbles and boulders present. The dwarf-shrubland soils have become relatively stabilized, are moist but well-drained, strongly acidic, and often have substantial peat layers. Environmental information was compiled from Baker (1980a), Bamberg (1961), Bamberg and Major (1968), Billings 2000, Cooper et al. (1997), Holland and Keil (1995), Komarkova (1976, 1980), Lewis (1970), Sawyer and Keeler-Wolf (1995, 2007), Sawyer et al. (2009), Willard (1963), and Zwinger and Willard (1996).

DISTRIBUTION

\*Geographic Range: This macrogroup occurs above upper timberline throughout the Rocky Mountains cordillera from New Mexico north into southwestern Alberta and south-central and southeastern British Columbia, Canada, and includes alpine areas west in the Utah high plateaus and high ranges in the Great Basin and Sierra Nevada. Stands of this macrogroup also extend north into the Klamath Mountains and drier southern and eastern Cascade Range, and south as far south as the Peninsular Ranges and White Mountains.

Nations: CA, US

States/Provinces: AB, AZ, BC, CA, CO, ID, MT, NM, NV, OR, UT, WA, WY

USFS Ecoregions (2007) [optional]: 322A:CC, 331J:CC, 341D:CC, 341E:CP, 341F:CP, 341G:CP, 342B:CC, 342J:CP, M242B:CC, M242C:CC, M242D:CC, M261A:CP, M261D:CC, M261E:CC, M261G:CC, M331A:CC, M331B:CC, M331D:CC, M331E:CC, M331F:CC, M331G:CC, M331H:CC, M331I:CC, M331J:CC, M332A:CC, M332B:CC, M332D:CC, M332E:CC, M332F:CC, M332G:CC, M333A:CC, M333B:CC, M333C:CC, M333D:CC, M341A:CC, M341B:CP, M341C:CC, M341D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G316 | Rocky Mountain-Sierran Alpine Dwarf-shrubland & Krummholz |
| G314 | Rocky Mountain-Sierran Alpine Turf & Fell-field |
| G571 | Rocky Mountain & Sierran Alpine Bedrock & Scree |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2015-08-25 | M100 Sierra Madre Alpine Scrub, Forb Meadow & Grassland Macrogroup | M100 merged into M099 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | AT Alpine Tundra (mesic to dry sites) | Ecosystems Working Group 1998 |  |
| > | Alpine Grassland (213) | Shiflet 1994 | SRM type 213 includes all alpine communities in Sierra, Klamath and California Cascades, both herbaceous and shrub dominated, and wet meadows. |
| > | Alpine Rangeland (410) | Shiflet 1994 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: K.A. Schulz, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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4. Polar & High Montane Scrub, Grassland & Barrens

4.B.1.Nb. Western North American Alpine Tundra

M101. Vancouverian Alpine Tundra

Type Concept Sentence: This macrogroup consists of well-vegetated to sparsely vegetated tundra areas, from bare, rocky summits and wind-blown dry sites to mesic and wet sites, above the altitudinal and longitudinal limit of trees in the Pacific Northwest coastal region north to maritime Alaska, including the Aleutian Islands, and is dominated by dwarf-shrubs genera such as *Cassiope, Empetrum, Phyllodoce, Salix*, and *Vaccinium* and herbaceous species such as *Anemone narcissiflora, Carex breweri, Festuca brachyphylla, Nephrophyllidium crista-galli, Polygonum bistortoides, Sanguisorba canadensis*, and *Valeriana sitchensis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 4.B.1.Nb. Western North American Alpine Tundra (D043)

Elcode: M101

\*Scientific Name: Vancouverian Alpine Tundra Macrogroup

\*Common (Translated Scientific) Name: Vancouverian Alpine Tundra Macrogroup

\*Colloquial Name: Vancouverian Alpine Tundra

\*Type Concept: This macrogroup consists primarily of alpine vegetation where dwarf-shrubs characterize the cover. The dwarf-shrubs vary in cover from sparse to continuous. Herbaceous meadows are also common, but even they often have a dwarf-shrub component. Rocky and sparsely vegetated sites are characteristic of the higher elevations and exposed sites. Dominant dwarf-shrub species include *Cassiope mertensiana, Cassiope tetragona, Dryas octopetala, Empetrum nigrum, Harrimanella stelleriana, Loiseleuria procumbens, Luetkea pectinata, Phyllodoce aleutica, Phyllodoce empetriformis, Phyllodoce glanduliflora, Salix arctica, Salix nivalis, Salix reticulata, Vaccinium uliginosum*, and *Vaccinium vitis-idaea*. Herbaceous species include *Aconitum delphiniifolium, Anemone narcissiflora, Arenaria capillaris, Artemisia arctica, Carex breweri, Carex capitata, Carex macrochaeta, Carex nardina, Carex proposita, Carex spectabilis, Castilleja unalaschcensis, Chamerion* spp., *Eriogonum pyrolifolium, Festuca brachyphylla, Festuca idahoensis ssp. roemeri, Fritillaria camschatcensis, Geranium erianthum, Lupinus nootkatensis, Nephrophyllidium crista-galli, Packera cana, Pedicularis contorta, Phlox diffusa, Polemonium acutiflorum, Polygonum bistortoides, Sanguisorba canadensis, Saxifraga tolmiei, Senecio triangularis, Valeriana sitchensis, Veratrum viride* and *Viola* spp. Some sites are dominated by nonvascular taxa such as *Racomitrium* spp. and *Stereocaulon* spp. This macrogroup occurs in the Pacific Northwest coastal region north to maritime Alaska, including the Aleutian Islands. It is primarily on alpine and subalpine sites, but it can also be found at lower elevations on the Alaska Peninsula, Aleutian Islands and Kodiak Island, where it is found on cliffs, rocky outcrops, exposed summits, windswept ridges, fell-fields, valley bottoms, sideslopes, stabilized dunes, terraces, moraines and fans. The dominant disturbances are snow avalanche, soil creep and freeze-thaw action.

\*Diagnostic Characteristics: The macrogroup is characterized by dwarf-shrub vegetation, often called alpine heath. Associated species are composed of a mixture of mesic to wet alpine and subalpine graminoids and forbs from the Pacific Northwest and Alaska.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M404 | Western Boreal Alpine Tundra |  |
| M099 | Rocky Mountain-Sierran Alpine Tundra |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: This macrogroup is characterized by an open to closed dwarf-shrub canopy frequently dominated by Ericaceous or *Salix* species, or an herbaceous layer, often composed of a mixture of perennial graminoids and forbs.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Overall species composition is diverse, and species richness is often very high; typically no single species is dominant. Dominant dwarf-shrub species include *Cassiope lycopodioides* (Haida Gwaii), *Cassiope mertensiana, Cassiope tetragona, Empetrum nigrum, Harrimanella stelleriana, Luetkea pectinata, Phyllodoce aleutica, Phyllodoce empetriformis*, and *Phyllodoce glanduliflora*. Other common species may include *Loiseleuria procumbens, Vaccinium cespitosum, Vaccinium deliciosum, Vaccinium membranaceum, Vaccinium uliginosum*, and *Vaccinium vitis-idaea*. Ericaceous species typically dominate, but sites dominated by *Salix arctica, Salix nivalis, Salix rotundifolia*, and *Salix reticulata* are included. Scattered tall shrubs and dwarf trees may also be present. Other co-associates include *Artemisia arctica* and *Arctostaphylos alpina*. Common herbaceous species include *Aconitum delphiniifolium, Anemone narcissiflora, Arenaria capillaris, Artemisia arctica, Athyrium filix-femina, Carex breweri, Carex capitata, Carex filifolia, Carex macrochaeta, Carex nardina, Carex proposita, Carex spectabilis, Castilleja unalaschcensis, Chamerion angustifolium (= Epilobium angustifolium), Chamerion latifolium, Deschampsia cespitosa, Eriogonum pyrolifolium, Festuca brachyphylla, Festuca idahoensis ssp. roemeri (= Festuca roemeri), Fritillaria camschatcensis, Geranium erianthum, Lupinus arcticus, Lupinus latifolius, Lupinus nootkatensis, Lupinus sellulus, Nephrophyllidium crista-galli, Oreostemma alpigenum, Packera cana, Pedicularis contorta, Phlox diffusa, Polemonium acutiflorum, Polygonum bistortoides, Polygonum viviparum, Sanguisorba canadensis, Saxifraga bronchialis, Saxifraga oppositifolia, Saxifraga tolmiei, Senecio triangularis, Valeriana sitchensis, Valeriana sitchensis, Veratrum viride*, and *Viola* spp. Bryophyte cover is often high. Sparsely vegetated stands on exposed areas often have nonvascular (lichen)-dominated communities, which includes taxa such as *Racomitrium* spp. and *Stereocaulon* spp.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The dominant disturbances are snow avalanche, soil creep and freeze-thaw action.

ENVIRONMENT

Environmental Description: This macrogroup occurs above the environmental limit of trees, at the highest elevations of the mountain regions of the Pacific Northwest coast north to southeastern maritime Alaska, primarily on alpine and subalpine sites, but it can also be found at lower elevations. A high snowpack characterizes this environment and much of this macrogroup occurs on slopes and depressions where snow lingers, the soil has become relatively stabilized, and the water supply is more-or-less constant. However, there are sites where wind scours snow off, and sites are characterized by the absence of persistent snow, wind desiccation, permafrost, and a short growing season. In the Aleutian Islands, stands occur on sideslopes, shoulder slopes, and low summits, and the terrain varies from gently sloping to steep. Sparsely vegetated stands occur on exposed summits, windswept ridges, and fell-fields. These sites are characterized by harsh environmental conditions. Slopes vary from moderately sloped to flat. The substrate is colluvium, residuum, or glacial till. Also included in this macrogroups are areas of exposed rock and rubble above the forestline (subalpine parkland and above) composed of barren and sparsely vegetated alpine substrates, typically including bedrock outcrops, scree slopes, rock crevices, upper mountain slopes, summits and nunataks.

DISTRIBUTION

\*Geographic Range: This macrogroup occurs in the highest elevations in the Cascade Range, from southwestern British Columbia south into northern California, the mountains of the Pacific Northwest coast north to southeastern maritime Alaska, primarily on alpine and subalpine sites, but it is also found at lower elevations on the Aleutian Islands, Kenai Fjords and in Prince William Sound.

Nations: CA, US

States/Provinces: AK, BC, CA, OR, WA

USFS Ecoregions (2007) [optional]: 322A:CC, 341D:CC, 341F:CP, 342B:CC, M242A:CC, M242B:CC, M242C:CC, M242D:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G317 | North Pacific Alpine-Subalpine Dwarf-shrubland & Heath |
| G320 | North Pacific Alpine-Subalpine Tundra |
| G319 | North Pacific Alpine-Subalpine Bedrock & Scree |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-08-18 | M120 Vancouverian Alpine Cliff, Scree & Rock Vegetation Macrogroup | M120 split between M101 (G319) & M099 (G572) |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | AM Alpine Meadow | Ecosystems Working Group 1998 |  |
| >< | AT Alpine Tundra | Ecosystems Working Group 1998 |  |
| > | Alpine Grassland (213) | Shiflet 1994 | SRM type 213 includes all alpine communities in Sierra, Klamath and California Cascades, both herbaceous and shrub dominated, and wet meadows. |
| >< | Alpine Idaho Fescue (108) | Shiflet 1994 |  |
| ? | Coastal Mountain-heather Alpine (CMA) zone | MacKenzie 2005 |  |
| >< | II.D.2.d - Mountain-heath tundra | Viereck et al. 1992 |  |
| >< | II.D.2.e - Cassiope tundra | Viereck et al. 1992 |  |
| >< | III.A.2.f - Mesic sedge-herb meadow tundra | Viereck et al. 1992 |  |
| >< | III.B.2.a - Mixed herbs | Viereck et al. 1992 |  |
| ? | Mesic Forb Alpine | Boggs et al. 2008a |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel

Acknowledgments [optional]:

Version Date: 29 Mar 2017

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5. Aquatic Vegetation

Open freshwater and saltwater wetlands dominated by aquatic vegetation, either rooted with leaves rising up to or near the surface, or floating freely on the water surface. Stands typically have surface water, generally up to 2 m in depth, along ocean, lake, pond, and river margins in non-tidal, tidal and intertidal habitats.

5.A. Saltwater Aquatic Vegetation

Saltwater Aquatic Vegetation occurs in shallow to deep saline habitats where emergent vegetation is <10% cover, and submerged or floating aquatic plants have >1% cover, occurring around the globe from the equator to the polar regions.

5.A.2. Benthic Macroalgae Saltwater Vegetation

The vegetation includes subtidal or intertidal bottoms and other areas dominated by attached macroalgae, including kelp, intertidal fucoids, and calcareous algae, which are usually submersed within or extend to the surface of the water column, though they may be exposed during low tides.

5. Aquatic Vegetation

5.A.2.Wb. Temperate Intertidal Shore

D047. Temperate Intertidal Shore

Type Concept Sentence: This vegetation consists of intertidal and shallow subtidal macroalgae communities in shallow brackish or saltwater coastal waters in the world's temperate to subpolar areas.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 5.A.2.Wb. Benthic Macroalgae Saltwater Vegetation (F053)

Elcode: D047

\*Scientific Name: Temperate Intertidal Shore Division

\*Common (Translated Scientific) Name: Temperate Intertidal Shore Division

\*Colloquial Name: Temperate Intertidal Shore

\*Type Concept: This vegetation consists of intertidal and shallow subtidal macroalgae communities in shallow brackish or saltwater coastal waters and associated intertidal shores in the world's temperate to subpolar areas. Representative taxa include *Agardhiella* spp., *Alaria* spp., *Ascophyllum nodosum, Bryopsis* spp., *Ceramium* spp., *Chaetomorpha* spp., *Champia* spp., *Chondrus crispus, Cladophora* spp., *Codium fragile, Colpomenia sinuosa, Desmarestia* spp., *Ectocarpus* spp., *Enteromorpha* spp., *Fucus* spp., *Gracilaria* spp., *Hildenbrandtia prototypus, Hypnea* spp., *Laminaria* spp., *Nitella* spp., *Phyllitis fascia, Polysiphonia* spp., *Porphyra laciniata, Rhizoclonium riparium, Spyridia* spp., *Ulva lactuca*, and *Vaucheria* spp. *Postelsia palmiformis* is characteristic of the North American Pacific Coast. Some submerged vascular plants may occur, including *Phyllospadix* spp. on rocky coasts. Habitats include subtidal and tidal flats of mud or gravel and rocky shoreline pools, outcrops, and reefs. These habitats are either permanently submerged or exposed and inundated daily and sometimes twice daily.

\*Diagnostic Characteristics: Vegetation is dominated by macroalgae taxa that are adapted to brackish or saltwater and occurs in benthic or intertidal littoral habitats in temperate to subpolar regions.

\*Classification Comments: Some seagrass communities occur that are more typical of rocky, high-energy intertidal zones (particularly *Phyllospadix* spp.) and ultimately might be considered a component of rocky shores because of shared vascular/nonvascular species and shared ecological settings.

The distinction between 5.A.2 ~Benthic Macroalgae Saltwater Vegetation Formation (F053)$$ (of which this division is a member) and 5.A.1 ~Floating & Suspended Macroalgae Saltwater Vegetation Formation (F052)$$ needs better clarification. Macroalgae of soft-bottomed intertidal or shallow subtidal substrates within 5.A.2 are primarily drifting or floating, and giant kelp rafts assigned to 5.A.1 are often anchored. A better distinction than benthic versus free-floating might be based on water depth.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D064 | Temperate Seagrass Aquatic Vegetation | is characterized by the dominance or importance of submerged vascular plant species, though macroalgae may also occur. |

Similar NVC Types General Comments [optional]: 5.A.1 ~Floating & Suspended Macroalgae Saltwater Vegetation Formation (F052)$$: No do divisions are recognized, but presumably they occur in deep waters and open oceans, rather than in shallow littoral zones [see Classification Comments].

VEGETATION

Physiognomy and Structure Summary: Vegetation is comprised primarily of thalli of benthic macroalgae. These vary from predominantly anchored and sessile (on rocky shores) to predominantly drifting or floating in the water column (in soft-bottomed habitats).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Representative taxa include *Agardhiella* spp., *Alaria* spp., *Ascophyllum nodosum, Bryopsis* spp., *Ceramium* spp., *Chaetomorpha* spp., *Champia* spp., *Chondrus crispus, Cladophora* spp., *Codium fragile, Colpomenia sinuosa, Desmarestia* spp., *Ectocarpus* spp., *Enteromorpha* spp., *Fucus* spp., *Gracilaria* spp., *Hildenbrandtia prototypus, Hypnea* spp., *Laminaria* spp., *Nitella* spp., *Phyllitis fascia, Polysiphonia* spp., *Porphyra laciniata, Rhizoclonium riparium, Spyridia* spp., *Ulva lactuca*, and *Vaucheria* spp. *Postelsia palmiformis* is characteristic of the North American Pacific Coast. Some submerged vascular plants may occur, including *Phyllospadix* spp. on rocky coasts.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Density and species composition vary with disturbance from currents, with seasonal water temperature change, and with water column nutrient concentrations.

ENVIRONMENT

Environmental Description: This vegetation occurs in shallow brackish or saltwater coastal waters and associated intertidal shores. The habitat is generally narrow on rocky coasts and more extensive in sandy or silty-bottomed settings, including coastal lagoons, estuaries, and river deltas. Stands may be permanently inundated in water up to several meters deep or repeatedly inundated and exposed to air in daily cycles, where they occur in intertidal zones. Macroalgae generally tolerate lower light conditions than do seagrasses and it likely occurs at greater depths and/or under more turbid conditions than do seagrasses.

*Climate:* The climate varies from temperate to subpolar.

*Soils/substrate:* Substrate may consist of bedrock, sand, gravel, or mud.

*Biogeography:* The concept is intended to serve worldwide, in temperate, boreal, and subpolar regions.

DISTRIBUTION

\*Geographic Range: In North America, this vegetation, as currently defined, ranges from Arctic regions south on the Pacific Coast to Baja California, Mexico, on the Atlantic Coast to North Carolina. The range extends to temperate and boreal intertidal and subtidal regions around the globe. South of those areas, a tropical analogue (presently undescribed) occurs (as with seagrasses).

Nations: CA, MX, US

States/Provinces: AK, BC, CA, CT, DE, LB, MA, MD, ME, MXBC, NB, NC, NF, NH, NJ, NS, NU, NY, ON, OR, PE, QC, RI, VA, WA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M104 | Temperate Atlantic Intertidal Shore |
| M106 | Temperate Pacific Seaweed Intertidal Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Lea

Acknowledgments [optional]:

Version Date: 28 Oct 2015

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

5. Aquatic Vegetation

5.A.2.Wb. Temperate Intertidal Shore

M106. Temperate Pacific Seaweed Intertidal Vegetation

Type Concept Sentence: This macrogroup is of marine algae living on tidal flats and rocky areas in the near-shore intertidal zone of the temperate North America Pacific coast. Some dominant species include *Enteromorpha* spp., *Fucus distichus, Postelsia palmiformis*, and *Vaucheria longicaulis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 5.A.2.Wb. Temperate Intertidal Shore (D047)

Elcode: M106

\*Scientific Name: Temperate Pacific Seaweed Intertidal Vegetation Macrogroup

\*Common (Translated Scientific) Name: Temperate Pacific Seaweed Intertidal Vegetation Macrogroup

\*Colloquial Name: Temperate Pacific Seaweed Intertidal Vegetation

\*Type Concept: This macrogroup consists of algal communities on coastal flats and intertidal rocky zones found along the north Pacific coast from Kodiak Island and Cook Inlet, Alaska, south to central California. Algae are the dominant vegetation on mud or gravel flats where little vascular vegetation is present due to the daily (in some cases twice daily) tidal flooding of salt or brackish water. Dominant species include *Enteromorpha* spp., *Fucus distichus, Postelsia palmiformis*, and *Vaucheria longicaulis*. Habitats are tidal flats of mud or gravel, rocky intertidal pools and reefs. These habitats are exposed and inundated daily and sometimes twice daily.

\*Diagnostic Characteristics: Tidal surfaces with algal communities exposed daily at low tide.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M184 | Temperate Pacific Seagrass Intertidal Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Low-statured (<0.5 m) herbaceous submerged and exposed saltwater algae-dominated areas within the intertidal zone.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Characteristic species include *Enteromorpha* spp., *Fucus distichus, Postelsia palmiformis*, and *Vaucheria longicaulis*. Floristic information compiled in part from Viereck et al. (1992), Holland and Keil (1995), and Boggs (2002).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: The near-shore intertidal zone is exposed daily (and sometimes twice daily) at low tide. Depth and extent of inundation may change due to tectonic uplift or subsidence, or by significant sedimentation.

ENVIRONMENT

Environmental Description: *Soil/substrate/hydrology:* Tidal flats of mud and gravel or rocky substrates. Tidal flats form a narrow band along oceanic inlets and are more extensive at the mouths of larger rivers. Tidal inundation of salt or brackish water and exposure occurs daily (in some cases twice daily). Environmental information compiled in part from Viereck et al. (1992), Holland and Keil (1995), and Boggs (2002).

DISTRIBUTION

\*Geographic Range: This macrogroup is found along the north Pacific Coast from Kodiak Island and Cook Inlet, Alaska, south to central California.

Nations: CA, US

States/Provinces: AK, BC, CA, OR, WA

USFS Ecoregions (2007) [optional]: 242A:CC, 261B:CC, 263A:CC, M242A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G385 | North American Pacific Intertidal Algal Flat |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| >< | III.B.3.d - Halophytic herb wet meadow | Viereck et al. 1992 |  |
| >< | III.D.2.a - Four-leaf marestail | Viereck et al. 1992 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K. Boggs, G. Kittel, M.S. Reid

Acknowledgments [optional]:

Version Date: 29 Mar 2017

REFERENCES

\*References [Required if used in text]:

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5.A.3. Benthic Vascular Saltwater Vegetation

The vegetation includes subtidal or intertidal bottoms of rooted vascular vegetation beds commonly dominated by any number of seagrass or eelgrass species, including species of *Cymodocea, Halodule, Thalassia, Halophila, Vallisneria, Ruppia, Phyllospadix*, and *Zostera*, and which are usually submersed in the water column or floating on the surface, or exposed during low tides.

5. Aquatic Vegetation

5.A.3.We. Temperate Seagrass Aquatic Vegetation

D064. Temperate Seagrass Aquatic Vegetation

Type Concept Sentence: This division is comprised of stands (beds) of submerged aquatic vascular plants in temperate to subpolar mesohaline to euhaline estuaries and near-shore areas of oceans of the Northern Hemisphere that are dominated by species of the genera *Zostera, Phyllospadix*, and/or *Ruppia* and/or by the species *Cymodocea nodosa* and/or *Posidonia oceanica*.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 5.A.3.We. Benthic Vascular Saltwater Vegetation (F054)

Elcode: D064

\*Scientific Name: *Zostera* spp. - *Phyllospadix* spp. - *Cymodocea nodosa* Aquatic Vegetation Division

\*Common (Translated Scientific) Name: Eelgrass species - Surf-grass species - Little Neptune-grass Aquatic Vegetation Division

\*Colloquial Name: Temperate Seagrass Aquatic Vegetation

\*Type Concept: This division is comprised of stands (beds) of submerged aquatic vascular vegetation in northern temperate to subpolar mesohaline to euhaline estuaries and near-shore areas of oceans of the world (seagrasses) that are dominated by species of the genera *Zostera* (including *Heterozostera*), *Phyllospadix, Posidonia, Amphibolis*, and/or *Ruppia* and/or by the species *Cymodocea nodosa, Halophila australis*, and/or *Thalassodendron pachyrhizum*. Stands occur along the subarctic to temperate Pacific coasts of North America and Asia, along the subarctic to temperate Atlantic coasts of North America, Europe, and northwestern Africa, and along the coasts of the Mediterranean and other inland seas of southwestern Eurasia.

\*Diagnostic Characteristics: This division is comprised of stands (beds) of submerged aquatic vascular plants in northern temperate to boreal mesohaline to euhaline estuaries and near-shore areas of oceans. Within the scope of the USNVC, diagnostic taxa include the genera *Zostera* and *Phyllospadix*. In other areas of the world, these genera and (in the Mediterranean Sea) *Posidonia oceanica* and *Cymodocea nodosa* are diagnostic.

\*Classification Comments: Although *Ruppia maritima* often is not considered a true "seagrass" (because it is less well-adapted to wave disturbance), its geographic range and salinity tolerance extend throughout that of most of the seagrasses. In the mid-Atlantic region of North America, it often occurs intermixed with *Zostera marina* (Thayer et al. 1984, Moore et al. 2000) within individual stands or as proximate stands in the same salinity regime. It is probably most practical to consider polyhaline and most mesohaline stands of *Ruppia maritima* as belonging to this division.

This division encompasses seagrass bioregions 1 (Temperate North Atlantic), 3 (Mediterranean), and 4 (Temperate North Pacific) of Short et al. (2007). *Zostera marina* and *Ruppia maritima* occur in all of the bioregions, but the individual regions share few other species (Short et al. 2007).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D047 | Temperate Intertidal Shore |  |
| D065 | Temperate Estuarine & Inland Brackish Aquatic Vegetation | intergrades with D064 along a salinity gradient, with D065 occupying salinity regimes of upper mesohaline or higher (approximately greater than 10 practical salinity units (psu)) and D064 in oligohaline to lower mesohaline regimes. Except for *Ruppia maritima*, there is generally little floristic overlap between the divisions. The presence of *Zostera* spp. and/or *Phyllospadix* spp. usually will be diagnostic of D064, while that of *Zannichellia palustris, Stuckenia pectinata, Potamogeton* spp., and other species that can grow in freshwater will indicate D065. Because of the wide salinity tolerance of *Ruppia maritima*, stands strongly dominated by that species may be problematic to assign. In these cases, the predominance of these other species as minor associates will often make the determination. Vascular plant stands that are monospecific with *Ruppia maritima* occur in both divisions and may have to be assigned by water salinity and/or by associated biota other than vascular plants. |
| D063 | Tropical Saltwater Vegetation | intergrades with D064 along a climate gradient in the southeastern Atlantic coast, with the boundary near the southern limit of the range of *Zostera marina* (approximately the North Carolina - South Carolina border). As with the conceptual boundary with D065, *Ruppia maritima* is characteristic of both divisions. In mixed stands near this boundary, the presence of *Zostera marina* indicates D063, while monospecific stands of *Halodule wrightii* or stands with both *Halodule wrightii* and *Ruppia maritima*, but without *Zostera marina*, generally will be assigned D064. Other taxa that are characteristic of D063 in the southeastern United States (*Halophila* spp., *Cymodocea filiformis*, and *Thalassia testudinum*) have ranges that do not overlap that of *Zostera marina*. On the Pacific coast of North America, the boundary between the two divisions occurs well south of the U.S. (south of Baja California). |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The vegetation is composed of submerged hydromorphic herbaceous plants with linear leaves that are "meadow-forming" (Batiuk et al. 1992) (rather than canopy-forming).

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Most stands are comprised of some combination of seagrasses of the genera *Zostera, Phyllospadix, Ruppia, Posidonia* (in the Mediterranean only), and/or *Cymodocea* (in the African/southern European Atlantic and Mediterranean only) (Green and Short 2003, Short et al. 2007).

Along the North American Atlantic coast, *Zostera marina* is the principal species. *Ruppia maritima* occurs through much of this range, either with *Zostera marina* or in monotypic stands in generally shallower and more protected settings. *Halodule wrightii*, a more characteristically tropical species, is a component near the southern limits of this division, in coastal lagoons in North Carolina (Green and Short 2003, Short et al. 2007).

Along the North American Pacific coast, *Zostera marina, Phyllospadix scouleri, Phyllospadix torreyi, Phyllospadix serrulatus, Ruppia maritima*, and *Nanozostera japonica (= Zostera japonica)* (not native to North America) are the principal species (Wyllie-Echeverria and Ackerman 2003, Green and Short 2003, Short et al. 2007). More locally, *Zostera asiatica* occurs in a few areas of southern California, and *Halodule wrightii* occurs in some southern areas of the division's range in the Gulf of California, south of the scope of the USNVC (Wyllie-Echeverria and Ackerman 2003).

Along the European and African Atlantic coast, principal species are *Zostera marina, Zostera noltii, Ruppia maritima*, and *Cymodocea nodosa* (Green and Short 2003, Short et al. 2007).

Along the Asian Pacific coast, principal species are *Phyllospadix iwatensis, Phyllospadix japonicus, Ruppia maritima, Zostera asiatica, Zostera caespitosa, Zostera caulescens, Nanozostera japonica*, and *Zostera marina* (Green and Short 2003, Short et al. 2007).

In the Mediterranean Sea and associated areas, principal species are *Cymodocea nodosa, Posidonia oceanica, Ruppia cirrhosa, Ruppia maritima, Zostera marina, Zostera noltii*, and the non-native *Halophila decipiens*, a more characteristically tropical species (Green and Short 2003, Short et al. 2007). *Stuckenia pectinata* also occurs in the Black, Azov, Caspian, and Aral seas (Milchakova 2003).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Increases in wave energy, decreases in water clarity due to suspended sediments or to eutrophication of the water column, mechanical removal (clam dredges, etc.), and disease (eelgrass wasting from the slime mold *Labyrinthula zosterae*) can all contribute to reduce the density of or to eliminate stands (Koch and Orth 2003). In temperate latitudes, such as along the mid-Atlantic coast, *Zostera marina* tends to maximize growth in late winter to spring, and stands lose biomass from leaf reduction in summer and fall warm periods. It may exhibit a winter annual phenology in southern latitudes (Meling-Lopez and Ibarra-Obando 2000).

ENVIRONMENT

Environmental Description: Stands occur in intertidal and subtidal areas of estuaries, coastal lagoons, or near-shore oceanic waters, usually on sandy, but occasionally on muddy or rocky substrates. The minimal depth limits of the beds are determined by low or high tide levels and the maximum depth limits by the penetration of light sufficient for photosynthesis, the latter being a function of water depth and water clarity. The maximum depth ranges from up to 2 m in the more turbid conditions of estuaries and lagoons (Koch and Orth 2007) to about 20 m in clear oceanic waters in the Atlantic and Pacific and about 50 m in the Mediterranean Sea (Short et al. 2007). Beds generally occur in areas with moderate current velocities (10-100 cm/sec in Chesapeake Bay (Koch et al. 2000)) and, usually, moderate wave action. *Ruppia maritima* is less tolerant of strong waves and currents than are other species and inhabits more protected areas, whereas *Phyllospadix* spp. generally are more tolerant of wave disturbance than most species. Water salinity ranges from mesohaline to upper euhaline (40 practical salinity units (psu) or greater). In the Chesapeake Bay of Maryland and Virginia, stands assigned to this division occupy areas that experience average spring salinities of at least 11 psu and average fall salinities of at least 18 psu (middle to upper mesohaline) (Schubel and Pritchard 1987, Moore et al. 2000).

*Climate:* Climate ranges from warm temperate to subpolar (Green and Short 2003, Short et al. 2007).

*Soils/substrate:* Generally, substrates are sandy (e.g., *Zostera* spp.) to, less frequently, muddy. Overly fine substrates are less likely to support healthy beds because of decreased pore water exchange with the overlying water column and greater potential for sulfide accumulations; overly coarse sediments have lower nutrient content (Koch et al. 2000). *Zostera marina* generally requires a substrate composed of between 8 and 30% silt and clay and less than 5% organic matter content (Koch et al. 2000). *Phyllospadix* spp. generally prefer rocky substrates, including submerged bedrock.

*Biogeography:* This division encompasses seagrass bioregions 1 (Temperate North Atlantic), 3 (Mediterranean), and 4 (Temperate North Pacific) of Short et al. (2007). *Zostera marina* and *Ruppia maritima* occur in all of the bioregions (Atlantic, Pacific, and Mediterranean), but the individual bioregions share few other species (Short et al. 2007).

DISTRIBUTION

\*Geographic Range: This division occurs along the temperate to subarctic Pacific coasts of North America (from the northern Bering Sea to southern Baja California and in the Gulf of California) and of Asia (from the northern Bering Sea to the northern East China Sea), along the temperate to subarctic Atlantic coasts of North America (from Greenland to North Carolina) and of Europe, and northwest Africa (from the Barents Sea to Western Sahara) , and in north Africa and southwestern Eurasia in the Mediterranean, Black, Caspian, Azov, and Aral Seas (Green and Short 2003, Short et al. 2007).

Nations: CA, MX, US

States/Provinces: AK, BC, CA, CT, LB, MA, MB, MD, ME, MXBC, NB, NC, NF, NH, NJ, NS, NU, NY, ON, OR, PE, QC, RI, VA, WA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M185 | Australian & Mediterranean Tapeweed |
| M184 | Temperate Pacific Seagrass Intertidal Vegetation |
| M183 | Temperate Eel-grass Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | seagrass communities of Temperate North Atlantic, Mediterranean, Temperate North Pacific, and Temperate Southern Oceans bioregions | Short et al. 2007 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: F. Short, T. Carruthers, W. Dennison , and M. Waycott (2007)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Lea

Acknowledgments [optional]: Much biogeographical information was drawn from Green and Short (2003) and individual authors and from Short et al. (2007).

Version Date: 29 Oct 2015

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5. Aquatic Vegetation

5.A.3.We. Temperate Seagrass Aquatic Vegetation

M184. Temperate Pacific Seagrass Intertidal Vegetation

Type Concept Sentence: This macrogroup contains the sub-tidal and intertidal zones of temperate North America Pacific Coast dominated by seagrass and surfgrass and other vascular species, including *Zostera marina* and *Phyllospadix scouleri*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 5.A.3.We. Temperate Seagrass Aquatic Vegetation (D064)

Elcode: M184

\*Scientific Name: Temperate Pacific Seagrass Intertidal Vegetation Macrogroup

\*Common (Translated Scientific) Name: Temperate Pacific Seagrass Intertidal Vegetation Macrogroup

\*Colloquial Name: Temperate Pacific Seagrass Intertidal Vegetation

\*Type Concept: This macrogroup consists of marine near-shore intertidal beds dominated by macrophytic algae and marine aquatic angiosperms. Beds are dominated by *Zostera marina* and *Phyllospadix scouleri*. Algae consists of *Fucus distichus, Postelsia palmiformis*, and other green and brown algae species. Common substrates include marine silts, but may also include exposed bedrock and cobble, where many algal species become attached with holdfasts. Stands occur in the subtidal/lower intertidal where the water is clear most of the time to allow for photosynthesis. They occur throughout intertidal zones with clear water along the temperate North American Pacific Coast, from Baja California north to Bristol Bay, Alaska. Stands occur in subtidal zones that are never exposed, as well as intertidal zones exposed to air.

\*Diagnostic Characteristics: North American Pacific near-shore marine aquatic vascular herbaceous vegetation.

\*Classification Comments: This macrogroup includes only vascular marine plants.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M106 | Temperate Pacific Seaweed Intertidal Vegetation | includes intertidal algae-dominated areas. |
| M109 | Western North American Freshwater Aquatic Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Saltwater aquatic herbs in the near-shore shallow environment.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Beds are dominated by flowering plants such as *Zostera marina (= Zostera pacifica)* and *Phyllospadix scouleri*. Algae species include *Fucus distichus* and *Postelsia palmiformis*, as well as a host of additional green and brown algae species. Description is based on Barbour and Major (1988), Viereck et al. (1992), Holland and Keil (1995), and Boggs (2002).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: *Soil/substrate/hydrology:* This macrogroup is found in intertidal zones with clear water in bays, inlets and lagoons. Subtidal portions are never exposed, while intertidal areas support species that can tolerate exposure to the air. Common substrates include marine silts. Stands occur in the subtidal/lower intertidal where the water is clear most of the time to allow for photosynthesis. Description combined from Barbour and Major (1988), Viereck et al. (1992), Holland and Keil (1995), and Boggs (2002).

DISTRIBUTION

\*Geographic Range: This macrogroup is found in along the temperate North America Pacific Coast, from Baja California, Mexico, north through California, Oregon, Washington, British Columbia and north into the Gulf of Alaska, Cook Inlet, and Bristol Bay coasts.

Nations: CA, MX, US

States/Provinces: AK, BC, CA, MXBC, OR, WA

USFS Ecoregions (2007) [optional]: 242A:CC, 261B:CC, 263A:CC, M242A:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G373 | Temperate Pacific Seagrass Bed |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | III.D.3.a - Eelgrass | Viereck et al. 1992 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: P. Comer, G. Kittel, K. Boggs, T. Keeler-Wolf

Acknowledgments [optional]:

Version Date: 29 Mar 2017

REFERENCES

\*References [Required if used in text]:

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5.B. Freshwater Aquatic Vegetation

Freshwater Aquatic Vegetation occurs in shallow to deep freshwater habitats where emergent vegetation is <10% cover, and submerged or floating aquatic plants have >1% cover, occurring around the globe from the equator to the polar regions.

5.B.1. Tropical Freshwater Aquatic Vegetation

Tropical Freshwater Aquatic Vegetation occurs in shallow to deep freshwater habitats where emergent vegetation is <10% cover, and submerged or floating-aquatic plants have >1% cover, occurring around the globe within the tropical regions (roughly, between 30°N and 30°S in latitude).

5. Aquatic Vegetation

5.B.1.Ed. Neotropical Freshwater Aquatic Vegetation

D097. Neotropical Freshwater Aquatic Vegetation

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 5.B.1.Ed. Tropical Freshwater Aquatic Vegetation (F056)

Elcode: D097

\*Scientific Name: Neotropical Freshwater Aquatic Vegetation Division

\*Common (Translated Scientific) Name: Neotropical Freshwater Aquatic Vegetation Division

\*Colloquial Name: Neotropical Freshwater Aquatic Vegetation

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D049 | North American Freshwater Aquatic Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, BS, CO, CU, EC, JM, MX, PE, PR, US, VE, XC, XE

States/Provinces: FL

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M291 | Neotropical Floating & Submerged Freshwater Marsh |
| M892 | Neotropical Ruderal Freshwater Aquatic Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al.

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

5. Aquatic Vegetation

5.B.1.Ed. Neotropical Freshwater Aquatic Vegetation

M291. Neotropical Floating & Submerged Freshwater Marsh

Type Concept Sentence: This macrogroup represents the aquatic plant communities of the Neotropics occurring in permanent to semipermanent waterbodies, with variations in the composition and structure of the communities depending on the type of water.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 5.B.1.Ed. Neotropical Freshwater Aquatic Vegetation (D097)

Elcode: M291

\*Scientific Name: Neotropical Floating & Submerged Freshwater Marsh Macrogroup

\*Common (Translated Scientific) Name: Neotropical Floating & Submerged Freshwater Marsh Macrogroup

\*Colloquial Name: Neotropical Floating & Submerged Freshwater Marsh

\*Type Concept: This macrogroup represents the aquatic plant communities of the Neotropics occurring in permanent to semipermanent waterbodies, with variations in the composition and structure of the communities depending on the type of water (mineralized, not mineralized, acidic). They include rooted submerged or partly submerged plants and pleustophytes. The majority of the species have very wide distributional ranges and include *Eleocharis acutangula, Fuirena robusta, Fuirena umbellata, Oxycaryum cubense, Syngonanthus caulescens, Drosera communis, Eichhornia azurea, Ludwigia helminthorrhiza, Utricularia* spp., *Nymphaea* spp., *Egeria najas, Websteria confervoides, Isoetes panamensis, Mayaca fluviatilis, Panicum elephantipes, Paspalum fluitans (= Paspalum repens), Acrostichum danaeifolium, Victoria amazonica, Eichhornia crassipes, Typha domingensis, Rhynchospora corymbosa, Azolla caroliniana, Salvinia auriculata, Pontederia rotundifolia, Neptunia natans, Cabomba furcata, Myriophyllum aquaticum (= Myriophyllum brasiliense), Thalia geniculata, Cyperus giganteus, Rhabdadenia macrostoma, Eleocharis interstincta*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, BR, BS, CO, CU, EC, PE, PR, VE, XC

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low - Poorly Documented

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G472 | Caribbean-Mesoamerican Aquatic Vegetation |
| G760 | Tropical South American Aquatic Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 08 Jan 2015

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

5.B.2. Temperate to Polar Freshwater Aquatic Vegetation

Temperate to Polar Freshwater Aquatic Vegetation occurs in shallow to deep freshwater habitats (e.g., lakes, ponds, canals, streams, rivers, and freshwater portions of estuaries) where emergent vegetation is <10% cover, and submerged or floating aquatic plants have >1% cover, occurring around the globe in both hemispheres, from the tropics north and south to the polar regions.

5. Aquatic Vegetation

5.B.2.Eb. Temperate South American Freshwater Aquatic Vegetation

D319. Temperate South American Freshwater Aquatic Vegetation

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 5.B.2.Eb. Temperate to Polar Freshwater Aquatic Vegetation (F057)

Elcode: D319

\*Scientific Name: Temperate South American Freshwater Aquatic Vegetation Division

\*Common (Translated Scientific) Name: Temperate South American Freshwater Aquatic Vegetation Division

\*Colloquial Name: Temperate South American Freshwater Aquatic Vegetation

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M865 | Temperate South American Freshwater Aquatic Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

5. Aquatic Vegetation

5.B.2.Eb. Temperate South American Freshwater Aquatic Vegetation

M865. Temperate South American Freshwater Aquatic Vegetation

Type Concept Sentence: Aquatic communities with submerged or floating plant species, as well as palustrine marshes dominated by tall grasses and sedges such as *Cyperus giganteus, Echinodorus grandiflorus, Fuirena robusta, Pontederia cordata, Sagittaria montevidensis, Schoenoplectus californicus, Typha domingensis*, and *Typha latifolia*, mixed with several widely distributed Neotropical aquatic species.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 5.B.2.Eb. Temperate South American Freshwater Aquatic Vegetation (D319)

Elcode: M865

\*Scientific Name: Temperate South American Freshwater Aquatic Vegetation Macrogroup

\*Common (Translated Scientific) Name: Temperate South American Freshwater Aquatic Vegetation Macrogroup

\*Colloquial Name: Temperate South American Freshwater Aquatic Vegetation

\*Type Concept: Besides the proper submerged or floating plant species, the macrogroup also includes palustrine marshes dominated by common tall grasses and sedges such as *Cyperus giganteus, Typha latifolia, Typha domingensis, Schoenoplectus californicus (= Scirpus californicus), Fuirena robusta, Pontederia cordata (= Pontederia lanceolata), Echinodorus grandiflorus, Sagittaria montevidensis*, mixed with several widely distributed Neotropical aquatic species.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, UY

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

5. Aquatic Vegetation

5.B.2.Na. North American Freshwater Aquatic Vegetation

D049. North American Freshwater Aquatic Vegetation

Type Concept Sentence: Floating-leaved and submergent aquatic vegetation found in permanently flooded but shallow freshwater sites across North America.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 5.B.2.Na. Temperate to Polar Freshwater Aquatic Vegetation (F057)

Elcode: D049

\*Scientific Name: *Potamogeton* spp. - *Nuphar* spp. - *Myriophyllum* spp. North American Freshwater Aquatic Vegetation Division

\*Common (Translated Scientific) Name: Pondweed species - Pond-lily species - Water-milfoil species North American Freshwater Aquatic Vegetation Division

\*Colloquial Name: North American Freshwater Aquatic Vegetation

\*Type Concept: This division comprises floating-leaved and submergent freshwater herbaceous vegetation found across North America from northern Canada to northern Mexico. Dominant plants are floating-leaved and submergent herbaceous species. Total aquatic vegetation cover can range from moderate to complete. Emergent plants are scattered to absent, with emergent cover <10%. Cosmopolitan species are often dominant in this division, though regional variants occur. Dominant floating-leaved species include *Azolla filiculoides, Brasenia schreberi, Nuphar* spp., *Polygonum amphibium, Potamogeton* spp., *Ranunculus aquatilis, Ranunculus trichophyllus, Wolffia* spp., and *Zannichellia palustris*. Submerged vegetation such as *Ceratophyllum* spp., *Elodea nuttallii, Elodea canadensis*, and *Myriophyllum* spp. are also common. Non-rooted floating-leaved plants, particularly *Lemna* spp. and *Spirodela polyrrhiza*, can be common though their dynamic nature means they may move depending on wind and currents. The division crosses temperate, boreal, and cool semi-desert climates across North America from northern Canada to northern Mexico. Freezing temperatures occur throughout these regions. Hydrologic conditions are relatively stable at these sites with permanent flooding in the growing season and water that moves at moderate speeds or less, except possibly during flood events. Thus, most stands in this division are in the shallower portions of ponds, lakes, and slow-moving edges or backwaters of permanent rivers and streams. Average water depth is often 1 m or more since shallower water is usually dominated by emergent species. The maximum depth in which this division can occur varies with water clarity but it can often be in water 1-3 m deep. Water chemistry is fresh to mildly saline.

\*Diagnostic Characteristics: Diagnostic criteria include permanently flooded freshwater wetlands with sparse to absent emergent plants and dominated by floating-leaved or submergent herbaceous plants. Dominant floating-leaved species include *Azolla filiculoides, Brasenia schreberi, Nuphar* spp., *Polygonum amphibium, Potamogeton* spp., *Ranunculus aquatilis, Ranunculus trichophyllus, Wolffia* spp., and *Zannichellia palustris*. Submerged vegetation such as *Ceratophyllum* spp., *Elodea nuttallii, Elodea canadensis*, and *Myriophyllum* spp. are also common. Non-rooted floating-leaved plants include *Lemna* spp. and *Spirodela polyrrhiza*.

\*Classification Comments: Stands of this division occur between shallow, emergent marshes or the upland boundary of a wetland and deeper water that does not support rooted vegetation. Stands of this division (D049) often occur adjacent to emergent marshes (2.C.4.Ne ~Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland Division (D322)$$, 2.C.4.Nd ~Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland Division (D323)$$, 2.C.4.Nb ~Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland Division (D031)$$, or 2.C.4.Nc~Southwestern North American Warm Desert Freshwater Marsh & Bosque Division (D032)$$), but differences in physiognomy and floristics make differentiation relatively easy.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D322 | Atlantic & Gulf Coastal Marsh, Wet Meadow & Shrubland |  |
| D065 | Temperate Estuarine & Inland Brackish Aquatic Vegetation |  |
| D097 | Neotropical Freshwater Aquatic Vegetation | occurs further south. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Dominant plants are floating-leaved and submergent herbaceous species. Total aquatic vegetation cover can range from sparse to dense. Emergent plants are scattered to absent, with <10% cover.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Cosmopolitan species are often dominant in this division, though regional variants occur. Dominant floating-leaved species include *Azolla filiculoides, Brasenia schreberi, Nuphar* spp., *Polygonum amphibium, Potamogeton* spp., *Ranunculus aquatilis, Ranunculus trichophyllus, Wolffia* spp., and *Zannichellia palustris*. Submerged vegetation such as *Ceratophyllum* spp., *Elodea nuttallii, Elodea canadensis*, and *Myriophyllum* spp. are also common. Non-rooted floating-leaved plants, particularly *Lemna* spp. and *Spirodela polyrrhiza*, can be common, though their dynamic nature means they may move depending on wind and currents.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Non-rooted floating-leaved plants may move over waterbodies depending on wind and currents. Where water levels fluctuate, or decline due to hydrological changes to a waterbody, emergent vegetation may establish, and this type may succeed to emergent wetland types.

ENVIRONMENT

Environmental Description: *Climate:* The division crosses temperate, boreal, and cool semi-desert climates across North America from northern Canada to northern Mexico. Freezing temperatures occur throughout these regions.

*Soils/substrate:* Hydrologic conditions are relatively stable at these sites with permanent flooding in the growing season and water that moves at moderate speeds or less, except possibly during flood events. Thus, most stands in this division are in the shallower portions of ponds, lakes, and slow-moving edges or backwaters of permanent rivers and streams. Average water depth is often 1 m or more since shallower water is usually dominated by emergent species. The maximum depth in which this division can occur varies with water clarity but it can often be in water 1-3 m deep. Water chemistry is fresh to mildly saline.

*Biogeography:* This division extends across all of temperate, boreal and cool semi-desert regions of North America, driven largely by the presence of available permanent waterbodies that are deep enough to exclude emergent vegetation.

DISTRIBUTION

\*Geographic Range: This division occurs throughout North America from northern Canada to northern Mexico and from coastal areas (though not ocean-influenced waters) to montane sites.

Nations: CA, MX, US

States/Provinces: AB, AK, AL, AR, BC, CA, CO, CT, DE, FL, GA, IA, ID, IL, IN, KS, KY, LA, LB, MA, MB, MD, ME, MI, MN, MO, MS, MT, NB, NC, ND, NE, NF, NH, NJ, NM, NS, NT?, NU, NV, NY, OH, OK, ON, OR, PA, PE, QC, RI, SC, SD, SK, TN, TX, VA, VT, WA, WI, WV, WY

USFS Ecoregions (2007) [optional]: 211:C, 212:C, 221:C, 223:C, 232:C, 234:C, 242:C, 251:C, 255:C, 315:C, 331:C, 342:C, M221:C, M223:C, M231:C, M242:C, M331:C, M332:C, M333:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M108 | Eastern North American Freshwater Aquatic Vegetation |
| M109 | Western North American Freshwater Aquatic Vegetation |
| M871 | Boreal Freshwater Aquatic Vegetation |
| M401 | North American Temperate Ruderal Aquatic Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| < | Lacustrine, Aquatic Beds, Rooted Vascular | Cowardin et al. 1979 |  |
| < | Palustrine, Aquatic Beds, Rooted Vascular | Cowardin et al. 1979 |  |
| < | Riverine, Aquatic Beds, Rooted Vascular | Cowardin et al. 1979 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: W.J. Mitsch and J.G. Gosselink (2000)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: J. Drake and D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 06 Jan 2016

REFERENCES

\*References [Required if used in text]:

Barbour, M. G., and W. D. Billings, editors. 2000. North American terrestrial vegetation. Second edition. Cambridge University Press, New York. 434 pp.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. FWS/OBS-79/31. USDI Fish & Wildlife Service, Office of Biological Services, Washington, DC. 103 pp.

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Mitsch, W. J., and J. G. Gosselink. 2000. Wetlands. Third edition. John Wiley & Sons, Inc., New York. 920 pp.

5. Aquatic Vegetation

5.B.2.Na. North American Freshwater Aquatic Vegetation

M109. Western North American Freshwater Aquatic Vegetation

Type Concept Sentence: This macrogroup consists of rooted and floating freshwater aquatic herbaceous vegetation dominated by western U.S. aquatic species *Azolla filiculoides, Azolla microphylla, Nuphar polysepala, Nymphaea tetragona, Stuckenia striata*, and several other cosmopolitan species, found throughout the temperate regions of western North America.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 5.B.2.Na. North American Freshwater Aquatic Vegetation (D049)

Elcode: M109

\*Scientific Name: *Nuphar polysepala - Azolla filiculoides - Elodea nuttallii* Western North American Freshwater Aquatic Vegetation Macrogroup

\*Common (Translated Scientific) Name: Rocky Mountain Pond-lily - Pacific Mosquito Fern - Western Waterweed Western North American Freshwater Aquatic Vegetation Macrogroup

\*Colloquial Name: Western North American Freshwater Aquatic Vegetation

\*Type Concept: This macrogroup consists of rooted, floating, and submerged freshwater aquatic herbaceous vegetation found throughout the temperate regions of western North America. Their occurrence tends to be small-patch or linear in spatial pattern, confined to lakes, ponds, oxbows, and slow-moving portions of rivers and streams. In large bodies of water, they are usually restricted to the littoral region where penetration of light is the limiting factor for growth. A variety of rooted or floating aquatic herbaceous species may dominate, including (but not limited to) *Azolla filiculoides, Nuphar polysepala, Polygonum amphibium, Potamogeton foliosus, Potamogeton diversifolius, Potamogeton epihydrus, Potamogeton robbinsii, Ranunculus aquatilis, Ranunculus trichophyllus*, and *Wolffia* spp. Submerged vegetation, such as *Ceratophyllum demersum, Ceratophyllum echinatum, Elodea canadensis, Elodea nuttallii, Myriophyllum hippuroides*, and *Myriophyllum sibiricum*, is often present. These communities occur in water too deep for emergent vegetation. Species composition is often dominated by cosmopolitan species but many regionally characteristic species may also occur. Characteristic western U.S. species include *Azolla filiculoides, Azolla microphylla, Nuphar polysepala, Nymphaea tetragona*, and *Stuckenia striata*.

\*Diagnostic Characteristics: Open water with rooted or floating herbaceous aquatic vegetation dominated by western U.S. aquatic species *Azolla filiculoides, Azolla microphylla, Nuphar polysepala, Nymphaea tetragona, Stuckenia striata*, and several other cosmopolitan species.

\*Classification Comments: Many dominant species are cosmopolitan; many species are regionally characteristic. The geographic spilt between eastern and western North America may be too arbitrary, and needs further review. These are open water wetlands with floating aquatic plants, and do *not* include the adjacent emergent marsh (*Scirpus, Schoenoplectus, Carex, Typha*, etc.). Characteristic western U.S. species include *Azolla filiculoides, Azolla microphylla, Nuphar polysepala, Nymphaea tetragona*, and *Stuckenia striata*. Presumably *Chara* spp. also belong in this type, as well as other macrogroups within the formation.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M888 | Arid West Interior Freshwater Marsh |  |
| M073 | Vancouverian Lowland Marsh, Wet Meadow & Shrubland | includes emergent vegetation, but not open-water rooted, floating and submerged aquatic vegetation. |
| M184 | Temperate Pacific Seagrass Intertidal Vegetation | includes aquatic marine saltwater vegetation. |
| M108 | Eastern North American Freshwater Aquatic Vegetation | includes aquatic floating and rooted vegetation found in lakes in eastern North America. Eastern U.S. species: *Alisma subcordatum, Azolla caroliniana* (and cosmopolitan), *Najas filifolia, Najas minor, Nuphar advena, Nymphaea odorata* (exotic in western U.S.), *Vallisneria americana*; east-central U.S.: *Cabomba caroliniana, Potamogeton tennesseensis*; northeastern and north-central U.S. and Canada: *Najas gracillima, Potamogeton bicupulatus, Potamogeton confervoides, Potamogeton hillii, Potamogeton oakesianus, Potamogeton obtusifolius, Potamogeton ogdenii, Potamogeton spirillus, Potamogeton strictifolius*, and *Potamogeton vaseyi*. |
| M871 | Boreal Freshwater Aquatic Vegetation | has similar species composition but occurs in arctic and boreal climatic areas. |
| M401 | North American Temperate Ruderal Aquatic Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Rooted, floating, or submerged aquatic herbaceous vegetation.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: A variety of rooted, floating, or submerged aquatic herbaceous species may dominate, including western U.S. characteristic species such as *Azolla filiculoides, Azolla microphylla (= Azolla mexicana), Nuphar polysepala, Nymphaea tetragona*, and *Stuckenia striata*. Most common dominants found in western U.S. waterbodies include *Azolla filiculoides, Azolla microphylla, Bacopa eisenii, Brasenia schreberi, Callitriche heterophylla, Callitriche palustris, Ceratophyllum demersum, Elodea canadensis, Fontinalis antipyretica, Hippuris vulgaris, Isoetes bolanderi, Isoetes howellii, Isoetes nuttallii, Isoetes occidentalis, Isoetes tenella (= Isoetes echinospora), Lemna minor, Ludwigia palustris, Menyanthes trifoliata, Myriophyllum hippuroides, Myriophyllum sibiricum, Nuphar polysepala, Nymphaea odorata, Polygonum amphibium, Polygonum hydropiperoides, Potamogeton diversifolius, Potamogeton foliosus, Potamogeton natans, Potamogeton richardsonii, Ranunculus aquatilis, Ranunculus lobbii, Ranunculus trichophyllus, Sagittaria latifolia, Schoenoplectus subterminalis, Sparganium angustifolium, Sparganium eurycarpum, Stuckenia filiformis, Stuckenia striata, Utricularia macrorhiza, Utricularia minor, Utricularia ochroleuca, Wolffia borealis*, and *Wolffia columbiana*. These communities generally occur in water too deep for emergent vegetation. Floristic information compiled from Viereck et al. (1992), Holland and Keil (1995), Shephard (1995), Boggs (2000), and Boggs et al. (2008a).

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description: *Climate:* Temperate North America, west of the Great Plains. *Soil/substrate/hydrology:* Vegetation floating in freshwater is small-patch in size, confined to lakes, ponds, oxbows, and slow-moving portions of rivers and streams. In larger bodies of water, stands are usually restricted to the littoral region where penetration of light is the limiting factor for growth. Soils may be either mineral or organic, often with a mucky or mucky-mineral surface layer. Environmental information compiled from Viereck et al. (1992), Holland and Keil (1995), Shephard (1995), Boggs (2000), and Boggs et al. (2008a).

DISTRIBUTION

\*Geographic Range: This macrogroup consists of freshwater aquatic herbaceous vegetation found throughout the temperate regions of western North America, from the Rocky Mountains, including New Mexico to Alberta, west to California and southern coastal Alaska.

Nations: CA, MX?, US

States/Provinces: AB?, AK, BC, CA, CO, ID, MT, NM, NV, OR, WA

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]: Easily recognizable in the field even though identification of taxa to species and subspecies can be difficult. However, it is strongly conceptual, has a wide geographic range, and diagnostic species may be difficult to distinguish from analogous type from eastern North America.

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G544 | Western North American Temperate Freshwater Aquatic Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| > | Freshwater Marshes: Open Water and Floating Island Zones | Mitsch and Gosselink 2000 | pp. 390-391 |
| > | III.D.1. - Freshwater aquatic herbaceous | Viereck et al. 1992 | Alaska |
| > | Shallow Waters | MacKenzie and Moran 2004 | British Columbia |

AUTHORSHIP

\*Primary Concept Source [if applicable]: G. Kittel, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: G. Kittel and D. Faber-Langendoen

Acknowledgments [optional]: Wetland and limnology scientists everywhere.

Version Date: 15 Oct 2014

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\*References [Required if used in text]:

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6. Open Rock Vegetation

Tropical, temperate, and boreal habitats are characterized or dominated by plant growth forms, such as *lichen, bryophyte, alga*, or *fern*, that have structural adaptations for living on stable rock surfaces or on unstable rocky substrates, such as cliffs, talus, scree, pavement, cobble, lava or boulderfields, and with associated mesomorphic grass, shrub and tree growth forms.

6.A. Tropical Open Rock Vegetation

Tropical rock habitats (such as cliffs, talus, scree, pavement, cobbles, lava, or boulderfields) at low elevations from approximately 23°N to 23°S latitude (typically frost-free) from the equator characterized by nonvascular plant growth forms that have structural adaptations for living on stable rock surfaces or in unstable rocky substrates. A sparse cover of various mesomorphic vascular growth forms, including woody plants, may be present.

6.A.1. Tropical Cliff, Scree & Other Rock Vegetation

Tropical rock habitats (such as cliffs, talus, scree, pavement, cobbles, lava, or boulderfields) at low elevations from approximately 23°N to 23°S latitude (typically frost-free) from the equator characterized by nonvascular plant growth forms that have structural adaptations for living on stable rock surfaces or in unstable rocky substrates. A sparse cover of various mesomorphic vascular growth forms, including woody plants, may be present.

6. Open Rock Vegetation

6.A.1.Ed. Brazilian-Parana Cliff, Scree & Rock Vegetation

D311. Brazilian-Parana Cliff, Scree & Rock Vegetation

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 6.A.1.Ed. Tropical Cliff, Scree & Other Rock Vegetation (F011)

Elcode: D311

\*Scientific Name: Brazilian-Parana Cliff, Scree & Rock Vegetation Division

\*Common (Translated Scientific) Name: Brazilian-Parana Cliff, Scree & Rock Vegetation Division

\*Colloquial Name: Brazilian-Parana Cliff, Scree & Rock Vegetation

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M867 | Brazilian-Parana Cliff, Scree & Rock Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

6. Open Rock Vegetation

6.A.1.Ed. Brazilian-Parana Cliff, Scree & Rock Vegetation

M867. Brazilian-Parana Cliff, Scree & Rock Vegetation

Type Concept Sentence: Saxicolous communities that develop on crystalline rocky outcrops of the Brazilian Shield or on shallow soils on sandstone plateaus in the Bolivian portion of the Cerrado biogeographic region. Characterized by open, short scrub with cacti and terrestrial bromeliads. Typically subject to stress due to the poor nutrient nature of the substrate. Typical species include *Ananas ananassoides, Anemia ferruginea, Aspidosperma tomentosum, Cereus hilldmannianus, Commiphora leptophloeos, Deuterocohnia longipetala, Discocactus heptacanthus, Echinopsis* spp., *Ficus calyptroceras, Frailea chiquitana, Gymnocalycium chiquitanum, Monvillea kroenleinii, Sapium argutum, Vellozia tubiflora*, and *Vellozia variabilis*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 6.A.1.Ed. Brazilian-Parana Cliff, Scree & Rock Vegetation (D311)

Elcode: M867

\*Scientific Name: Brazilian-Parana Cliff, Scree & Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Brazilian-Parana Cliff, Scree & Rock Vegetation Macrogroup

\*Colloquial Name: Brazilian-Parana Cliff, Scree & Rock Vegetation

\*Type Concept: This macrogroup represents specialized saxicolous communities that develop on crystalline rock outcrops of the Brazilian Shield or very shallow soils at the top of sandstone plateaus distributed in the Bolivian portion of the Cerrado biogeographic region. The physiognomy of these communities is that of an open, short scrub, with cacti and terrestrial bromeliads. In general they are subject to strong drought stress due to the nature of the substrate. Dominant families are Velloziaceae, Bromeliaceae, and Cactaceae. Characteristic species include *Commiphora leptophloeos, Sapium argutum, Ficus calyptroceras, Aspidosperma tomentosum, Cochlospermum vitifolium, Ananas ananassoides, Anemia ferruginea, Monvillea kroenleinii, Deuterocohnia longipetala, Echinopsis hammerschmidii, Echinopsis calochlora, Discocactus heptacanthus, Frailea chiquitana, Gymnocalycium chiquitanum, Cereus hilldmannianus, Selaginella sellowii, Selaginella convoluta, Vellozia tubiflora*, and *Vellozia variabilis*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

6. Open Rock Vegetation

6.A.1.Eg. Guianan Montane Cliff, Scree & Rock Vegetation

D310. Guianan Montane Cliff, Scree & Rock Vegetation

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 6.A.1.Eg. Tropical Cliff, Scree & Other Rock Vegetation (F011)

Elcode: D310

\*Scientific Name: Guianan Montane Cliff, Scree & Rock Vegetation Division

\*Common (Translated Scientific) Name: Guianan Montane Cliff, Scree & Rock Vegetation Division

\*Colloquial Name: Guianan Montane Cliff, Scree & Rock Vegetation

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M851 | Tepuyan Cliff, Scree & Rock Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

6. Open Rock Vegetation

6.A.1.Eg. Guianan Montane Cliff, Scree & Rock Vegetation

M851. Tepuyan Cliff, Scree & Rock Vegetation

Type Concept Sentence: Communities formed by a short, sparse shrub stratum scattered above a lower layer of grasses and rosulate and tubiform forbs. They grow on rocky substrates derived from quartzite on hillsides of the tepuis in Venezuela between 300-1000 m elevation as well as at lower elevation on disjunct Guiana Shield formations in the Colombian Amazon. Diagnostic species include *Aechmea chantinii, Arrabidaea nigrescens, Axonopus canescens, Bulbostylis lanata, Byrsonima amoena, Caraipa llanorum, Clusia chiribiquetensis, Decagonocarpus cornutus, Dioclea guianensis, Gongylolepis martiana, Graffenrieda fantastica, Ilex divaricata, Lagenocarpus pendulus, Mezia huberi, Navia garcia-barrigae, Navia hohenbergioides, Paspalum lanciflorum, Trachypogon plumosus, Vellozia phantasmagoria*, and *Vellozia tubiflora*.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 6.A.1.Eg. Guianan Montane Cliff, Scree & Rock Vegetation (D310)

Elcode: M851

\*Scientific Name: Tepuyan Cliff, Scree & Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Tepuyan Cliff, Scree & Rock Vegetation Macrogroup

\*Colloquial Name: Tepuyan Cliff, Scree & Rock Vegetation

\*Type Concept: Communities formed by a short, sparse shrub stratum scattered over a lower layer of grasses, and rosulate and tubiform forbs. They grow on rocky substrates derived from quartzite, on hillsides of the Guianan Plateau tepuis in Venezuela, between 300-800 (1000) m asl. They also occur at lower altitudes on disjunct Guiana Shield formations scattered in the Colombian Amazon. Diagnostic species include *Trachypogon plumosus, Axonopus canescens, Paspalum lanciflorum, Bulbostylis lanata, Vellozia tubiflora, Navia hohenbergioides, Caraipa llanorum, Byrsonima amoena, Mezia huberi, Dioclea guianensis, Arrabidaea nigrescens, Vellozia phantasmagoria, Decagonocarpus cornutus, Gongylolepis martiana, Lagenocarpus pendulus, Aechmea chantinii, Clusia chiribiquetensis, Graffenrieda fantastica, Navia garcia-barrigae*, and *Ilex divaricata*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, VE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

6. Open Rock Vegetation

6.A.1.Eh. Tropical Andean Cliff, Scree & Rock Vegetation

D312. Tropical Andean Cliff, Scree & Rock Vegetation

Type Concept Sentence:

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 6.A.1.Eh. Tropical Cliff, Scree & Other Rock Vegetation (F011)

Elcode: D312

\*Scientific Name: Tropical Andean Cliff, Scree & Rock Vegetation Division

\*Common (Translated Scientific) Name: Tropical Andean Cliff, Scree & Rock Vegetation Division

\*Colloquial Name: Tropical Andean Cliff, Scree & Rock Vegetation

\*Type Concept:

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO, CO, EC, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M855 | Bolivian-Tucuman Cliff, Scree & Rock Vegetation |
| M854 | Central Andean (Yungas) Cliff, Scree & Rock Vegetation |
| M853 | Northern Andean Cliff, Scree & Rock Vegetation |
| M856 | Moist Puna Cliff, Scree & Rock Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]:

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description:

Acknowledgments [optional]:

Version Date:

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

6. Open Rock Vegetation

6.A.1.Eh. Tropical Andean Cliff, Scree & Rock Vegetation

M855. Bolivian-Tucuman Cliff, Scree & Rock Vegetation

Type Concept Sentence: Vegetation communities that have developed on rocky outcrops or steep, rocky slopes of the Andes in southeastern Bolivian and northwestern Argentina. Dominated by rosulate bromeliads, small xeromorphic ferns, small to medium-sized cacti, and a few other succulents, that include several local endemics. Distributed in areas of humid to subhumid climate between 1400 and 3800 m elevation. Characteristic species at low elevations of the range include *Abromeitiella brevifolia, Cleistocactus* spp., *Deuterocohnia* spp., *Echeveria* spp., *Grahamia vulcanensis, Parodia* spp., *Puya* spp., *Rebutia fiebrigii, Tillandsia* spp., and *Weingartia* spp. Higher up *Lobivia tiegeliana, Puya fiebrigii*, and *Puya minima* are common.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 6.A.1.Eh. Tropical Andean Cliff, Scree & Rock Vegetation (D312)

Elcode: M855

\*Scientific Name: Bolivian-Tucuman Cliff, Scree & Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Bolivian-Tucuman Cliff, Scree & Rock Vegetation Macrogroup

\*Colloquial Name: Bolivian-Tucuman Cliff, Scree & Rock Vegetation

\*Type Concept: The macrogroup represents the vegetation communities developed on rock outcrops or rocky, steep montane slopes of the Andes in southeastern Bolivian and northwestern Argentina dominated by rosulate bromeliads, small xeromorphic ferns, small to medium-sized cacti, and a few other succulents that include several restricted, local endemics. It is distributed in areas of humid to sub-humid climate between 1400 and 3800 m elevation. Characteristic species and genera at low elevations of the altitudinal range include *Abromeitiella brevifolia, Rebutia fiebrigii, Grahamia vulcanensis, Echeveria* spp., *Cleistocactus* spp., *Parodia* spp., *Weingartia* spp., *Puya* spp., *Deuterocohnia* spp., and *Tillandsia* spp. In the upper portion of the elevational range are *Lobivia tiegeliana, Puya fiebrigii, Puya minima*, among others.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: AR, BO

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-09-03 | M860 Bolivian-Tucuman Subandean Xeromorphic Cliff & Other Rock Vegetation Macrogroup | M860 concept covered by M855 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

6. Open Rock Vegetation

6.A.1.Eh. Tropical Andean Cliff, Scree & Rock Vegetation

M853. Northern Andean Cliff, Scree & Rock Vegetation

Type Concept Sentence: Sparse vegetation growing in poor, eroded soils on steep and stony slopes and cliffs of the intermontane dry valleys above 2000 m elevation in the Andes of Venezuela, Colombia and Ecuador. Dominant genera include the succulents *Furcraea, Echeveria*, terrestrial xeromorphic species of *Tillandsia*, and the spiny *Puya* spp.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 6.A.1.Eh. Tropical Andean Cliff, Scree & Rock Vegetation (D312)

Elcode: M853

\*Scientific Name: Northern Andean Cliff, Scree & Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Northern Andean Cliff, Scree & Rock Vegetation Macrogroup

\*Colloquial Name: Northern Andean Cliff, Scree & Rock Vegetation

\*Type Concept: This macrogroup includes the sparse vegetation growing on steep and stony slopes and cliffs of the intermontane dry valleys in the Andes of Venezuela, Colombia and Ecuador on poor, eroded soils, above 2000 m elevation. Dominant genera include the succulents *Furcraea, Echeveria*, terrestrial xeromorphic species of *Tillandsia*, and the spiny *Puya*.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: CO, EC

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

6. Open Rock Vegetation

6.A.1.Eh. Tropical Andean Cliff, Scree & Rock Vegetation

M856. Moist Puna Cliff, Scree & Rock Vegetation

Type Concept Sentence: Various types of discontinuous communities developed on rocky outcrops or rocky colluvium in locations across the Andean Altiplano of Peru and Bolivia, above 3000 m elevation. Dominated by rosulate spiny bromeliads, small xeromorphic ferns, various pulvinate or prostrate suffruticose plants, and globular or shrubby cacti. Characteristic genera and species include *Puya, Pitcairnia, Echinopsis, Echeveria, Peperomia, Cheilanthes, Notholaena, Astrolepis sinuata*, and *Senecio rufescens, Saxifraga magellanica, Lobivia cespitosa*, and *Woodsia montevidensis* at higher elevations.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 6.A.1.Eh. Tropical Andean Cliff, Scree & Rock Vegetation (D312)

Elcode: M856

\*Scientific Name: Moist Puna Cliff, Scree & Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Moist Puna Cliff, Scree & Rock Vegetation Macrogroup

\*Colloquial Name: Moist Puna Cliff, Scree & Rock Vegetation

\*Type Concept: The macrogroup represents various types of discontinuous communities developed on rock outcrops or rocky colluvium in locations across the Andean plateau or Altiplano of Peru and Bolivia, above 3000 m elevation and dominated by rosulate spiny bromeliads, small xeromorphic ferns, various pulvinate or prostrate suffruticose plants, and globular or shrubby cacti. Characteristic genera and species include *Puya, Pitcairnia, Echinopsis, Echeveria, Peperomia, Cheilanthes, Notholaena, Astrolepis sinuata*, and *Senecio rufescens, Saxifraga magellanica, Lobivia cespitosa, Woodsia montevidensis* at higher elevations.

\*Diagnostic Characteristics:

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary:

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary:

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics:

ENVIRONMENT

Environmental Description:

DISTRIBUTION

\*Geographic Range:

Nations: BO, PE

States/Provinces:

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Unassigned

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
|  |  |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: C. Josse, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: C. Josse

Acknowledgments [optional]:

Version Date: 17 Apr 2014

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

6.B. Temperate & Boreal Open Rock Vegetation

Rocky habitats (such as cliffs, talus, scree, pavement, cobbles, recent lava flows, or large rock outcrops) characterized by temperate, including Mediterranean, and boreal lithomorphic and lithophilic growth forms, including saxicolous *lichens, bryophytes, algae*, and/or *ferns* and other pteridophytes. Tree growth forms typically have <10% cover, are very sparse; woody growth forms, when present, include cold-deciduous broad-leaved and needle-leaved trees and shrubs. Vegetation found on temperate and boreal rocky habitats (such as cliffs, talus, recent lava flows, or rock outcrops) at low to moderate elevations at mid-latitudes from 23°to 70°N or S latitude around the globe that are characterized by nonvascular plant growth forms that have structural adaptations for living on these habitats.

6.B.1. Temperate & Boreal Cliff, Scree & Other Rock Vegetation

Vegetation in temperate and boreal habitats found in rocky or rocklike habitats (such as cliffs, talus, scree, pavement, cobbles, lava, boulderfields, or badlands) at low elevations at mid-latitudes around the globe characterized by nonvascular plant growth forms that have structural adaptations for living on stable rock surfaces or in unstable rocky substrates. A sparse cover of vascular mesomorphic growth forms, including needle-leaved and cold-deciduous broad-leaved woody plants, may be present.

6. Open Rock Vegetation

6.B.1.Na. Eastern North American Temperate Cliff, Scree & Rock Vegetation

D051. Eastern North American Temperate Cliff, Scree & Rock Vegetation

Type Concept Sentence: This type encompasses vegetation of eastern and boreal North America found on somewhat to strongly vertical cliffs, talus slopes, and erosional bluffs and characterized by sparse and patchy vascular vegetation and often high nonvascular and fern cover.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 6.B.1.Na. Temperate & Boreal Cliff, Scree & Other Rock Vegetation (F034)

Elcode: D051

\*Scientific Name: *Polypodium virginianum - Asplenium platyneuron - Eriogonum* spp. Cliff & Rock Vegetation Division

\*Common (Translated Scientific) Name: Rock Polypody - Ebony Spleenwort - Buckwheat species Cliff & Rock Vegetation Division

\*Colloquial Name: Eastern North American Temperate Cliff, Scree & Rock Vegetation

\*Type Concept: This division encompasses vegetation of eastern and boreal North American cliffs, talus slopes and erosional bluffs characterized by often sparse and patchy vascular vegetation and often high nonvascular cover. It ranges from the East Coast west to the Ouachitas and upper Great Lakes and through central and eastern boreal Canada. Vegetation structure varies widely, and may include scattered small trees such as *Betula papyrifera, Juniperus virginiana, Picea glauca, Pinus banksiana, Pinus strobus, Thuja occidentalis*, and *Quercus* spp. Other commonly encountered species may include *Asplenium* spp., *Cystopteris fragilis, Danthonia spicata, Dasiphora fruticosa ssp. floribunda, Deschampsia cespitosa, Dryopteris marginalis, Hydrangea arborescens, Parthenocissus quinquefolia, Polypodium virginianum, Ribes* spp., *Rubus pubescens, Sibbaldiopsis tridentata*, and *Toxicodendron radicans*. Characteristic foliose and fruticose macrolichen genera include *Cladonia, Lasallia, Stereocaulon*, and *Umbilicaria*. Crustose lichens are also common. Substrates include all lithologies from acidic granites to circumneutral basalts to calcareous limestones, with concomitant floristic variation. These cliffs are prone to harsh climatic conditions; frequent disturbances include drought stress and wind and storm damage. Most of the substrate is dry and exposed, but small (occasionally large) areas of seepage are often present. The vegetation is patchy and sparse overall, except in some wet, or seepy, areas where the rocks are often densely or moderately covered with bryophytes or algae. Outside of the glaciated regions and the Appalachian Mountains, this vegetation is primarily limited to river gorges and bluffs. A specialized habitat within this macrogroup is the vertical walls of limestone sinkholes. Vegetation occurring on shoreline examples seems to be mostly restricted to areas protected from wave action, ice-scour, and wind.

\*Diagnostic Characteristics: This type has sparse vascular vegetation and variable cryptogam (bryophyte, lichen and ferns) cover found on some to strongly vertical cliffs, talus slopes, and erosional bluffs of eastern temperate and central to eastern boreal North America. Cliffs and other rock vegetation with >10% vascular cover of trees, shrubs and herbs are placed elsewhere.

\*Classification Comments:

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D052 | Western North American Temperate Cliff, Scree & Rock Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Vascular vegetation is sparse, patchy, and widely variable in structure, with scattered trees, shrubs, and herbs. The nonvascular and fern component varies from sparse to dense cover. Physiognomy is variable.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Floristics vary with geography, substrate, and moisture availability. Taxa include *Aquilegia canadensis, Asplenium* spp., *Arabis* spp., *Betula* spp., *Corydalis sempervirens, Cystopteris bulbifera, Cystopteris fragilis, Danthonia spicata, Dasiphora fruticosa ssp. floribunda, Deschampsia cespitosa, Dryopteris marginalis, Hydrangea arborescens, Juniperus virginiana, Parthenocissus quinquefolia, Pellaea atropurpurea, Phlox subulata, Picea glauca, Pinus banksiana, Pinus strobus, Polypodium* spp., *Quercus* spp., *Sibbaldiopsis tridentata (= Potentilla tridentata), Saxifraga michauxii, Saxifraga virginiensis, Schizachyrium scoparium, Thuja occidentalis, Toxicodendron radicans*, and *Woodsia obtusa*. Characteristic foliose and fruticose lichen genera include *Cladonia, Flavoparmelia, Lasallia, Stereocaulon*, and *Umbilicaria*. Characteristic crustose lichen genera include *Caloplaca, Dimelaena, Fuscidea, Lepraria, Physcia*, and *Porpidia*. Bryophytes are also common.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: On cliffs, plants that are rooted in crevices or ledges are subject to erosion or slumping. Severe drought can also limit woody encroachment on sites with dry aspects.

ENVIRONMENT

Environmental Description: *Climate:* Climate is primarily north temperate and boreal, but this type spans a wide area. *Soils/substrate:* Substrate includes rocky cliffs, talus, and unconsolidated to mineral materials (bluffs) that are somewhat to strongly vertical. Consolidated rock substrates comprise various lithologies, including basalt-diabase, granite-metamorphic, limestone-dolostone, shale, or sandstone. Landforms include cliffs, erosional slopes, talus slopes, riverside outcrops and gorges, and shorelines of waterbodies. Cliffs range from overhanging to vertical to nearly vertical, with the physical structure usually irregular, with some ledges and crevices. Moisture levels vary drastically over short distances. Seepage of groundwater from adjacent soils or through rock fractures often creates permanently or seasonally flooded microsites, while lack of soil makes other portions extremely dry. In less sheltered topography, slope and aspect affect overall moisture levels to some degree. Rock chemistry and moisture appear to be the most important factors affecting different associations on cliff sites. On talus, small pockets among the rocks provide rooting substrates; on bluffs, plants have more rooting sites available, but they are subject to erosion or slumping.

DISTRIBUTION

\*Geographic Range: This type ranges in the boreal region from eastern to central Canada, and in the temperate region from New England and adjacent Canada west to the Great Lakes and northern Minnesota, south through the Appalachians and Piedmont (occasional in the Atlantic Coastal Plain), and west across the Cumberland Plateau and Interior Low Plateau to the Ozarks.

Nations: CA, MX?, US

States/Provinces: AB, AL, AR, CO, CT, FL, GA, IA, IL, IN, KS, KY, LA, MA, MB, MD, ME, MI, MN, MO, MS, MT, NB, NC, ND, NE, NH, NJ, NM, NS, NY, OH, OK, ON, PA, QC, RI, SC, SD, SK, TN, TX, VA, VT, WI, WV, WY

USFS Ecoregions (2007) [optional]: 211:C, 212:C, 251:C, M211:C, M221:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M111 | Eastern North American Cliff & Rock Vegetation |
| M116 | Great Plains Cliff, Scree & Rock Vegetation |
| M115 | Great Plains Badlands Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2016-01-11 | D053 Eriogonum pauciflorum - Lichens Great Plains Scree & Rock Vegetation Division | merged |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: S. Gawler, D. Faber-Langendoen, and S. Menard, in Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S. Gawler, S. Menard, L. Sneddon, D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 11 Jan 2016

REFERENCES

\*References [Required if used in text]:

Albert, D. A., P. J. Comer, R. A. Corner, D. Cuthrell, M. Penskar, and M. Rabe. 1995. Bedrock shoreline survey of the Niagaran Escarpment in Michigan's Upper Peninsula: Mackinac County to Delta County. Michigan Natural Features Inventory for Land and Water Management Division (grant # CD-0.02).

Clark, P. W. 2012. Cliff ecology: Extent, biota, and recreation of cliff environments in the New River Gorge, WV. M.S. thesis, Department of Geology and Geography, West Virginia University, Morgantown. 106 pp.

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

Larson, D. W., U. Matthes, and P. E. Kelly. 2000b. Cliff ecology: Patterns and processes in cliff ecosystems. Cambridge University Press, Cambridge, MA.

6. Open Rock Vegetation

6.B.1.Na. Eastern North American Temperate Cliff, Scree & Rock Vegetation

M111. Eastern North American Cliff & Rock Vegetation

Type Concept Sentence: This type encompasses vegetation of eastern temperate North America found on somewhat to strongly vertical cliffs, talus slopes, and erosional bluffs and characterized by sparse and patchy vascular vegetation and often high nonvascular and fern cover.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 6.B.1.Na. Eastern North American Temperate Cliff, Scree & Rock Vegetation (D051)

Elcode: M111

\*Scientific Name: *Sibbaldiopsis tridentata - Polypodium virginianum / Cladonia* spp. Eastern North American Cliff & Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Shrubby Fivefingers - Rock Polypody / Cup Lichen species Eastern North American Cliff & Rock Vegetation Macrogroup

\*Colloquial Name: Eastern North American Cliff & Rock Vegetation

\*Type Concept: This type encompasses vegetation of eastern temperate and boreal North American cliffs, talus slopes and erosional bluffs characterized by often sparse and patchy vascular vegetation and often high nonvascular cover. It ranges from the East Coast west to the Ouachitas and upper Great Lakes and through central and eastern boreal Canada. Vegetation structure varies widely, and may include scattered small trees such as *Betula papyrifera, Juniperus virginiana, Picea glauca, Pinus banksiana, Pinus strobus, Thuja occidentalis*, and *Quercus* spp. Other commonly encountered species may include *Asplenium* spp., *Cystopteris fragilis, Danthonia spicata, Dasiphora fruticosa ssp. floribunda, Deschampsia cespitosa, Dryopteris marginalis, Hydrangea arborescens, Parthenocissus quinquefolia, Polypodium virginianum, Ribes* spp., *Rubus pubescens, Sibbaldiopsis tridentata*, and *Toxicodendron radicans*. Characteristic foliose and fruticose macrolichen genera include *Cladonia, Lasallia, Stereocaulon*, and *Umbilicaria*. Crustose lichens are also common. Substrates include all lithologies from acidic granites to circumneutral basalts to calcareous limestones, with concomitant floristic variation. These cliffs are prone to harsh climatic conditions; frequent disturbances include drought stress and wind and storm damage. Most of the substrate is dry and exposed, but small (occasionally large) areas of seepage are often present. The vegetation is patchy and sparse overall, except in some wet, or seepy, areas where the rocks are often densely or moderately covered with bryophytes or algae. Outside of the glaciated regions and the Appalachian Mountains, this vegetation is primarily limited to river gorges and bluffs. A specialized habitat within this macrogroup is the vertical walls of limestone sinkholes. Vegetation occurring on shoreline examples seems to be mostly restricted to areas protected from wave action, ice-scour, and wind.

\*Diagnostic Characteristics: This type has sparse vascular vegetation and variable cryptogam (bryophyte, lichen and ferns) cover found on some to strongly vertical cliffs, talus slopes, and erosional bluffs of eastern temperate and central to eastern boreal North America. Cliffs and other rock vegetation with >10% vascular cover of trees, shrubs and herbs are placed elsewhere.

\*Classification Comments: This is a large and "bulky" macrogroup which is geographically broad and floristically heterogeneous. More sampling is needed to determine how best to divide it, either at the group or alliance level, and whether the boreal group should be moved with other boreal rock groups to a separate boreal macrogroup or even division. Rocky outcrop vegetation, typically on flat, more vascular-vegetated habitats, is placed elsewhere in a number of shrub and grassland macrogroups in 2.B.2.Nc ~Eastern North American Grassland & Shrubland Division (D024)$$. Cliffs with sufficient cover of vascular plants (>10% cover) are placed with forest and woodland, shrubland and grassland types. There may be some degree of floristic overlap between rock outcrops and cliff and talus, and the distinction may be strongest when based on overall physiognomy (i.e., <10% vascular cover, cryptogam cover variable).

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M880 | Eastern North American Wet Shoreline Vegetation | occupies open rocky shorelines on rivers and beaches, if wet enough. |
| M116 | Great Plains Cliff, Scree & Rock Vegetation | is similarly sparsely vegetated but geographically separated. |

Similar NVC Types General Comments [optional]: This macrogroup is very broadly defined, with sparse, widely variable vegetation composition and structure. It has similar substrate types but they are influenced by different macroclimatic features.

VEGETATION

Physiognomy and Structure Summary: Vascular vegetation is sparse, patchy, and widely variable in structure, with scattered trees, shrubs, and herbs. The nonvascular and fern component varies from sparse to dense cover. Physiognomy is variable.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Floristics vary with geography, substrate, and moisture availability. Taxa include *Aquilegia canadensis, Asplenium* spp., *Arabis* spp., *Betula* spp., *Corydalis sempervirens, Cystopteris bulbifera, Cystopteris fragilis, Danthonia spicata, Dasiphora fruticosa ssp. floribunda, Deschampsia cespitosa, Dryopteris marginalis, Hydrangea arborescens, Juniperus virginiana, Parthenocissus quinquefolia, Pellaea atropurpurea, Phlox subulata, Picea glauca, Pinus banksiana, Pinus strobus, Polypodium* spp., *Quercus* spp., *Sibbaldiopsis tridentata (= Potentilla tridentata), Saxifraga michauxii, Saxifraga virginiensis, Schizachyrium scoparium, Thuja occidentalis, Toxicodendron radicans*, and *Woodsia obtusa*. Characteristic foliose and fruticose lichen genera include *Cladonia, Flavoparmelia, Lasallia, Stereocaulon*, and *Umbilicaria*. Characteristic crustose lichen genera include *Caloplaca, Dimelaena, Fuscidea, Lepraria, Physcia*, and *Porpidia*. Bryophytes are also common.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: On cliffs, plants that are rooted in crevices or ledges are subject to erosion or slumping. Severe drought can also limit woody encroachment on sites with dry aspects.

ENVIRONMENT

Environmental Description: *Climate:* Climate is primarily north temperate and boreal, but this type spans a wide area. *Soil/substrate/hydrology:* Substrate includes rocky cliffs, talus, and unconsolidated to mineral materials (bluffs) that are somewhat to strongly vertical. Consolidated rock substrates comprise various lithologies, including basalt-diabase, granite-metamorphic, limestone-dolostone, shale, or sandstone. Landforms include cliffs, erosional slopes, talus slopes, riverside outcrops and gorges, and shorelines of waterbodies. Cliffs range from overhanging to vertical to nearly vertical, with the physical structure usually irregular, with some ledges and crevices. Moisture levels vary drastically over short distances. Seepage of groundwater from adjacent soils or through rock fractures often creates permanently or seasonally flooded microsites, while lack of soil makes other portions extremely dry. In less sheltered topography, slope and aspect affect overall moisture levels to some degree. Rock chemistry and moisture appear to be the most important factors affecting different associations on cliff sites. On talus, small pockets among the rocks provide rooting substrates; on bluffs, plants have more rooting sites available, but they are subject to erosion or slumping.

DISTRIBUTION

\*Geographic Range: This type ranges in the boreal region from eastern to central Canada, and in the temperate region from New England and adjacent Canada west to the Great Lakes and northern Minnesota, south through the Appalachians and Piedmont (occasional in the Atlantic Coastal Plain), and west across the Cumberland Plateau and Interior Low Plateau to the Ozarks.

Nations: CA, MX?, US

States/Provinces: AB?, AL, AR, CT, FL, GA, IA, IL, IN, KY, LA, MA, MB, MD, ME, MI, MN, MO, MS, NB, NC, NH, NJ, NS, NY, OH, OK, ON, PA, QC, RI, SC, SK?, TN, TX, VA, VT, WI, WV

USFS Ecoregions (2007) [optional]: 211:C, 212:C, 251:C, M211:C, M221:C

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Low

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G340 | Northeastern Erosional Bluff Vegetation |
| G839 | Laurentian-Acadian-Great Lakes Cliff & Rock Vegetation |
| G840 | Appalachian Cliff & Rock Vegetation |
| G841 | Central Midwest-Interior Cliff & Rock Vegetation |
| G842 | Southeast Coastal Plain Cliff & Rock Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2016-01-12 | M879 North American Boreal Cliff, Scree & Rock Vegetation Macrogroup | M879 split & merged with M111 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: S. Gawler, D. Faber-Langendoen, and S. Menard, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: S. Gawler, S. Menard, L. Sneddon, D. Faber-Langendoen

Acknowledgments [optional]:

Version Date: 08 Jan 2016

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6. Open Rock Vegetation

6.B.1.Na. Eastern North American Temperate Cliff, Scree & Rock Vegetation

M116. Great Plains Cliff, Scree & Rock Vegetation

Type Concept Sentence: This macrogroup is found throughout the Great Plains on cliffs, bluffs, and rock outcrops, with vegetation comprised of sparse, rocky vegetation and sparse to abundant lichens.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 6.B.1.Na. Eastern North American Temperate Cliff, Scree & Rock Vegetation (D051)

Elcode: M116

\*Scientific Name: Great Plains Cliff, Scree & Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Great Plains Cliff, Scree & Rock Vegetation Macrogroup

\*Colloquial Name: Great Plains Cliff, Scree & Rock Vegetation

\*Type Concept: This macrogroup consists of cliffs, bluffs, and rock outcrops in the Great Plains from the U.S.-Canadian border area south to Texas. It is defined by having sparse vascular vegetation, cryptograms and an abundance of exposed bedrock. The bedrock exposure can be vertical, sloping, or horizontal along rivers, at the tops of buttes, in dry canyons, or, rarely, large, low bedrock outcrops. The bedrock is usually sedimentary (sandstone, limestone, shale, gypsum, siltstone), but granite, rhyolite and (rarely) quartzite also occur. Vegetation is generally sparse except where soil accumulates in pockets or ledges. Dominant species vary greatly depending on geology of the bedrock, climate, aspect, slope, and slope position. Lichens predominate on exposed rock. Common vascular species found in this macrogroup are able to tolerate the dry to xeric conditions and poor soil development. These include *Bouteloua eriopoda* (in the southwest), *Bouteloua gracilis, Bouteloua hirsuta, Bouteloua rigidiseta, Cercocarpus montanus, Erioneuron pilosum, Juniperus* spp., *Opuntia* spp., *Rhus trilobata*, and *Vulpia octoflora*. Cryptogams, especially lichen species, need to be described.

\*Diagnostic Characteristics: This macrogroup is characterized by sparse, rocky vegetation (generally <10% vascular cover) on consolidated rock outcrops or scree/talus fields below cliffs in the Great Plains. Nonvascular species, especially lichens, can be very common on exposed rock.

\*Classification Comments: The concept of this macrogroup is fairly distinct within the Great Plains though individual sites may have enough vegetation to be confused with dry prairie or dry woodland macrogroups. This macrogroup is largely defined by the Great Plains vascular flora associated with it, and it is on that basis that we separate it from other open bedrock macrogroups, both in the East, i.e., ~Eastern North American Cliff & Rock Vegetation Macrogroup (M111)$$, and the West, i.e., ~Western North American Cliff, Scree & Rock Vegetation Macrogroup (M887)$$, as well as more vascular-dominated rocky types, such as ~Southern Barrens & Glade Macrogroup (M308)$$, that contain rocky grasslands. Badlands vegetation in ~Great Plains Badlands Vegetation Macrogroup (M115)$$ is distinct in its substrate (thin erodible clays and silts over bedrock), sparse vascular vegetation, and lack of cryptogams, especially lichens.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M308 | Southern Barrens & Glade | is found generally south and east of M116, but where their ranges are adjacent or overlap in the southern Great Plains, better diagnostic criteria are needed. |
| M118 | Intermountain Basins Cliff, Scree & Badland Sparse Vegetation |  |
| M111 | Eastern North American Cliff & Rock Vegetation |  |
| M115 | Great Plains Badlands Vegetation | is distinct in its substrate (thin erodible clays and silts over bedrock), sparse vascular vegetation, and rarely contains cryptogams, such as lichens. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Examples of this macrogroup have low, sparse vascular vegetation and a range of nonvascular, typically lichen, cover. The most abundant vascular species at a site are usually small trees, shrubs or grasses but can be forbs in a few cases. Trees and shrubs are typically short, and mixedgrass species dominate the herbaceous stratum. Nonvascular cover is not well-described.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Species composition is a product of soil depth. In locations and patches where soils are the shallowest, only drought-tolerant plants will persist, many of which are annuals. The number of perennial taxa increases with increasing soil depth. On exposed rock surfaces, the dominant species may be nonvascular plants such as lichens. Common grass species include *Aristida oligantha, Bouteloua curtipendula, Bouteloua hirsuta, Bouteloua rigidiseta, Erioneuron pilosum, Schizachyrium scoparium*, and *Vulpia octoflora (= Festuca octoflora)*. Common forbs are *Asclepias pumila, Calylophus hartwegii, Chaetopappa asteroides, Chaetopappa ericoides, Cheilanthes feei, Croton monanthogynus, Dalea enneandra, Echinacea angustifolia, Echinocereus reichenbachii, Eriogonum flavum, Eriogonum longifolium, Evolvulus nuttallianus, Haploesthes greggii, Stenaria nigricans, Heliotropium tenellum, Hybanthus verticillatus, Lesquerella gordonii, Lesquerella ovalifolia, Mentzelia oligosperma, Nama stevensii, Pellaea atropurpurea, Pediomelum cuspidatum, Penstemon cobaea, Penstemon fendleri, Paronychia jamesii, Plantago patagonica, Plantago wrightiana, Scutellaria wrightii, Sedum nuttallianum, Sedum pulchellum, Selaginella peruviana, Symphyotrichum fendleri*, and *Thelesperma ambiguum*. When present, woody taxa might include *Cissus trifoliata, Forestiera pubescens, Juniperus ashei, Juniperus monosperma, Juniperus pinchotii, Juniperus virginiana, Mimosa borealis, Quercus mohriana, Rhus aromatica, Sapindus saponaria*, and *Sideroxylon lanuginosum*.

Common trees and shrubs are junipers, including *Juniperus monosperma* (in the southwest), *Juniperus scopulorum* (in the west), *Juniperus virginiana* (in the east and north), *Juniperus communis, Juniperus horizontalis*, and other shrubs, such as *Artemisia longifolia, Cercocarpus montanus, Rhus trilobata*, and *Ribes aureum*. Common grasses include *Bouteloua eriopoda* (in the southwest), *Bouteloua gracilis, Bouteloua hirsuta, Bouteloua rigidiseta, Calamovilfa longifolia, Cercocarpus montanus, Erioneuron pilosum, Pseudoroegneria spicata* (in the northwest), *Schizachyrium scoparium*, and *Vulpia octoflora*. Nonvascular species, especially lichens, can be very common on exposed rock, and further review of their species composition is needed.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Drought and erosion, both from wind and water, are important in maintaining sites in this macrogroup. These factors, combined with the steep slopes on many sites, greatly limit the species that can exist.

ENVIRONMENT

Environmental Description: *Climate:* The division occurs within two climate types (sensu Trewartha): Temperate Continental and Dry Steppe (semi-arid). As a result, there are distinct gradients of precipitation and temperate within the division. The precipitation gradient extends along an east-to-west axis, with an average annual precipitation of 1014mm at Lawrence, Kansas, to 477.5mm at Boise City, Oklahoma. The western extent of the region is subject to periodic, often severe, droughts. The temperature gradient follows a south-north gradient. The annual average temperature in the southern extent of the division is 18.6°C (mean high of 25.7°C and a mean low 11.6°C) at San Angelo, Texas, to 3.1°C in Regina, Saskatchewan (a mean high of 18.9°C in July and a mean low of -14.7°C). Nevertheless, these sites all tend to be xeric and very hot during the summer months.

*Soils/substrate:* Sites in this macrogroup have significant exposure of bedrock. The bedrock can be vertical, sloping, or horizontal along rivers, at the tops of buttes, in dry canyons, or, rarely, large, low bedrock outcrops. The bedrock is usually sedimentary (sandstone, limestone, shale, gypsum, siltstone), but granite and rhyolite also occur and in southwestern Minnesota, an area of quartzite outcrops is included in this macrogroup. Soil development is limited to cracks, ledges, or depressions in the bedrock. Soils are dry and easily erodible. This macrogroup is found in an arid to semi-arid climate with infrequent heavy summer rains that can erode soils that have developed.

DISTRIBUTION

\*Geographic Range: This macrogroup is found in the Great Plains from southern Canadian Great Plains south to northern Texas, and from the Rocky Mountain foothills to southwestern Minnesota, eastern Kansas and possibly northwestern Iowa and Missouri.

Nations: CA, US

States/Provinces: AB, CO, IA?, KS, MB, MN, MO?, MT, ND, NE, NM, OK, SD, SK?, TX, WY

USFS Ecoregions (2007) [optional]: 251B:CC, 251C:C?, 251E:CP, 251F:CC, 251H:CC, 315A:CC, 315B:CC, 315F:CC, 331B:CC, 331C:CC, 331D:CC, 331E:CC, 331F:CC, 331G:CC, 331H:CC, 331I:CC, 331K:CP, 331L:CC, 331M:CC, 331N:CC, 332A:CP, 332B:CC, 332C:CC, 332D:CC, 332E:CP, 332F:CC, 342F:PP, M313B:PP, M331B:PP, M331F:PP, M331I:PP

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G567 | Great Plains Cliff, Scree & Rock Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Crystalline Bedrock Outcrop (Prairie) Type [ROs12a] | Minnesota DNR 2005b |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: J. Drake, D. Faber-Langendoen and B. Hoagland

Acknowledgments [optional]:

Version Date: 14 Jan 2016

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\*References [Required if used in text]:

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6. Open Rock Vegetation

6.B.1.Na. Eastern North American Temperate Cliff, Scree & Rock Vegetation

M115. Great Plains Badlands Vegetation

Type Concept Sentence: This badlands macrogroup is found in the northern Great Plains where erodible parent material is dissected into dry, sparsely vegetated, generally steep slopes, usually above rivers or perennial or intermittent streams. The dominant vegetation is a mix of shrubs, forbs, and grasses with each dominating some areas.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 6.B.1.Na. Eastern North American Temperate Cliff, Scree & Rock Vegetation (D051)

Elcode: M115

\*Scientific Name: Great Plains Badlands Vegetation Macrogroup

\*Common (Translated Scientific) Name: Great Plains Badlands Vegetation Macrogroup

\*Colloquial Name: Great Plains Badlands Vegetation

\*Type Concept: This macrogroup includes badlands vegetation in the northern Great Plains of the United States and Canada. Vegetation cover is typically sparse but can be moderate in limited areas with shallower slopes. The dominant vegetation is a mix of shrubs, forbs, and grasses with each dominating some areas. There is typically zonation of vegetation from the top of a slope to the bottom with different groups of species most common in certain zones. Typical species found in Great Plains badlands are the shrubs *Artemisia cana, Artemisia longifolia, Artemisia tridentata, Atriplex* spp., *Eriogonum flavum, Eriogonum pauciflorum, Gutierrezia sarothrae, Juniperus horizontalis*, and *Sarcobatus vermiculatus*. Forbs include *Iva axillaris*, among others. Graminoids, though uncommon, include *Pseudoroegneria spicata*, and, in saline seepages, *Distichlis spicata*. Examples are found on slopes above rivers or streams, with erodible clay and poorly consolidated shale interspersed with sandstone, lignite lenses, and occasional scoria outcrops.

\*Diagnostic Characteristics: This macrogroup is found on eroded landforms with generally <10% vascular vegetation cover. Soft, erodible bedrock is exposed or less than 1 m below the surface. Typical species included are *Artemisia cana, Artemisia longifolia, Artemisia tridentata, Atriplex* spp., *Eriogonum flavum, Eriogonum pauciflorum, Gutierrezia sarothrae, Juniperus horizontalis, Iva axillaris*, and *Sarcobatus vermiculatus*. Mixedgrass prairie graminoid species are typically very low in cover or absent.

\*Classification Comments: This macrogroup is relatively distinct from others due to the sparse vegetation and unique substrate within the northern Great Plains. Sites with greater vegetation cover typical of adjacent grasslands may be hard to distinguish from more vegetated mixedgrass prairie.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| M051 | Great Plains Mixedgrass & Fescue Prairie |  |
| M118 | Intermountain Basins Cliff, Scree & Badland Sparse Vegetation |  |
| M116 | Great Plains Cliff, Scree & Rock Vegetation |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: Great Plains badlands are typically sparsely vegetated (<10% total vascular vegetation cover). The sloping, eroding sites with bedrock at or near surface, lack of soil development, and lack of available moisture for plants limit the species that can grow. Small areas with shallower slopes, including step-in-slopes, toeslopes, etc., may have moderate vegetation cover. Dominant plants are usually shrubs and forbs, though grasses can dominate some areas. Dominant plants rarely grow more than about 1 m tall.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Characteristic species can be shrubs, grasses or forbs. Common shrubs include *Artemisia cana, Artemisia tridentata, Atriplex confertifolia, Ericameria nauseosa, Juniperus horizontalis*, and *Sarcobatus vermiculatus*; common grasses include *Achnatherum hymenoides, Pseudoroegneria spicata, Pascopyrum smithii* (on more mesic sites), and *Distichlis spicata (= Distichlis stricta)* (in saline seepages). Common forbs include *Arenaria hookeri, Artemisia longifolia, Eriogonum pauciflorum, Eriogonum flavum, Iva axillaris, Gutierrezia sarothrae*, and *Grindelia squarrosa*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Badlands are dry for nearly all of the growing season due to the steep slopes and semi-arid climate in which they occur. Infrequent heavy summer rains can cause notable erosion and contribute substantially to shaping stands of this macrogroup. In southwestern South Dakota, erosion can remove as much as one inch of sediment per year (Stoffer 2003).

ENVIRONMENT

Environmental Description: Badlands by definition have soft, erodible bedrock at or near the surface. A combination of additional factors, such as elevation, rainfall, carving action of streams, and parent material, can contribute to the development of badlands. Sites where they develop have strongly dissected landscapes and steep slopes. This macrogroup contains extremely dry and easily erodible, consolidated clayey soils with bands of sandstone or isolated consolidates. This macrogroup is found within an arid to semi-arid climate with infrequent, but torrential, rains that cause erosion. Where the associated bedrock is marine in origin, substrates may be slightly to highly saline in nature.

DISTRIBUTION

\*Geographic Range: This macrogroup is found in the northern Great Plains region of the United States and Canada with some extensive examples in western North Dakota, southwestern South Dakota, southeastern Montana, southern Alberta and Saskatchewan.

Nations: CA, US

States/Provinces: AB, CO, MB?, MT, ND, NE, SD, SK, WY

USFS Ecoregions (2007) [optional]: 331E:CP, 331F:CC, 331G:CC, 331K:CC, 331L:CC, 331M:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: High

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G566 | Great Plains Badlands Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
|  |  |  |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
| = | Badlands and River Breaks | Barker and Whitman 1989 |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: J. Drake

Acknowledgments [optional]:

Version Date: 15 Oct 2014

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6. Open Rock Vegetation

6.B.1.Nb. Western North American Temperate Cliff, Scree & Rock Vegetation

D052. Western North American Temperate Cliff, Scree & Rock Vegetation

Type Concept Sentence: This division is characterized by the vegetation of rocky or rock-like habitats, including outcrops, cliffs, talus, or scree, in low- to mid-elevation, temperate and boreal climatic areas of western North America. Cryptogam vegetation tends to dominate, with vascular plants species of low cover.

OVERVIEW

\*Hierarchy Level: Division

\*Placement in Hierarchy: 6.B.1.Nb. Temperate & Boreal Cliff, Scree & Other Rock Vegetation (F034)

Elcode: D052

\*Scientific Name: *Pseudotsuga menziesii / Umbilicaria* spp. - *Aspidotis densa* Western North American Temperate Rock Vegetation Division

\*Common (Translated Scientific) Name: Douglas-fir / Rocktripe Lichen species - Indian's Dream Western North American Temperate Rock Vegetation Division

\*Colloquial Name: Western North American Temperate Cliff, Scree & Rock Vegetation

\*Type Concept: This division occurs throughout temperate and boreal western North America and consists of sparsely to moderately vegetated rock outcrops and cliff faces, talus and scree from the Alaska Peninsula and Aleutian Islands, boreal Alaska, Coast Mountains of British Columbia, the Rocky Mountain Cordillera, Cascades, Sierra Nevada and other ranges tall enough to have a temperate climate. The vegetation is highly variable and is typically a sparse cover of vascular species with sparse to dense cover of lichens, mosses, ferns or fern allies. Characteristic nonvascular species include lichens of the genera *Umbilicaria, Rhizocarpon, Stereocaulon, Cladonia*, mosses of the genera *Tortula, Racomitrium*, or *Polytrichum*, ferns such as *Aspidotis densa, Cryptogramma acrostichoides*, or *Woodsia oregana*, or other cryptogams such as *Selaginella* spp. Overall, the nonvascular species are poorly characterized. Vascular plant species that can survive these harsh environments, e.g., *Arctostaphylos* spp., *Juniperus* spp., *Penstemon* spp., or *Sedum* spp., or grasses such as *Festuca viridula, Poa curtifolia*, or *Pseudoroegneria spicata*, can also occur. In deeper cracks or crevices, where soil accumulates, stunted trees can occur, including *Abies concolor, Abies lasiocarpa, Abies magnifica, Pinus albicaulis, Pinus contorta, Pinus flexilis, Pinus monticola, Pinus ponderosa, Pseudotsuga menziesii, Populus tremuloides, Tsuga mertensiana*, or *Pinus edulis*.

\*Diagnostic Characteristics: Vegetation is characterized by cryptogams (mosses, lichens, ferns and fern allies) with a sparse cover of herbaceous and woody vascular plants on exposed bedrock or talus. Woody plants include various shrub and tree species capable of surviving on these harsh sites. Insufficient information is available regarding diagnostic mosses and other nonvascular species; vascular plants include a range of typical western North American herb, shrub and tree species that are tolerant of the harsh conditions on these sites.

\*Classification Comments: Insufficient information is available regarding mosses and other nonvascular species on these sites. The species presented here are based on limited data. The diagnostic species for this division cannot be evaluated with the lack of information on the mosses and lichens; however, the associated vascular flora will certainly differ between this division and other rock vegetation divisions.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
| D022 | Western North American Grassland & Shrubland | includes grassland and shrubland vegetation within the range of D052 that occurs on upland sites with better soil development. |
| D027 | Pacific North American Coastal Scrub & Herb Vegetation | includes vegetation of sea cliffs, scree slopes, rocky bluffs and beaches that are close to the Pacific coast and are exposed to wind, salt spray and occasional ocean wave action. |
| D051 | Eastern North American Temperate Cliff, Scree & Rock Vegetation | includes vegetation of similar habitats but in areas to the east of D052, characterized by a Great Plains flora. |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The vegetation typically contains a covering of lichens and/or mosses growing on the rock surfaces, usually with some sparse covering of vascular plants, usually growing in soil pockets. The resulting structure and physiognomy is highly variable as it can include scattered trees, shrubs, grasses or forbs along with variable moss and/or lichen cover. Trees and shrubs often grow in dense clumps out of cracks in bedrock and small soil deposits and are often stunted.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: Characteristic nonvascular species include a variety of foliose and crustose lichens of the genera *Umbilicaria, Rhizocarpon, Stereocaulon, Cladina, Cladonia*, dry-site mosses of the genera *Tortula, Racomitrium*, or *Polytrichum*, ferns such as *Aspidotis densa, Cryptogramma acrostichoides*, or *Woodsia oregana*, or other cryptogams such as *Selaginella* spp. Overall, the nonvascular species are poorly characterized even though they predominate on these sites. Many vascular plants occur on these sites; however, they are mostly of low cover and vigor, as soils are mostly thin or unstable. The species are generally vascular plants that can survive these harsh environments, e.g., *Arctostaphylos* spp., *Ceanothus* spp., *Juniperus* spp., *Penstemon* spp., or *Sedum* spp., or certain grasses. The associated vascular flora varies considerably over the range of this vegetation type. In forested landscapes, trees from the surrounding forests can survive on these rocky sites in small pockets of soil or, on talus, where the substrate is relatively stable. Potential trees include the full range of western North American species; however, those of dry sites are most common, e.g., *Arbutus menziesii, Pinus albicaulis, Pinus flexilis, Pinus contorta var. latifolia, Pinus ponderosa, Populus tremuloides, Pseudotsuga menziesii, Pinus edulis, Quercus garryana*, and *Juniperus* spp. In moist or high-elevation climates, other tree species can occur, including *Abies concolor, Abies lasiocarpa, Pinus monticola*, or *Tsuga mertensiana*.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots: \*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Talus and scree are subject to ongoing downslope movement. Soil development on outcrops and cliffs is slow and is best developed in fissures where windblown materials accumulate and/or freeze-thaw action eventually results in some finer parent material.

ENVIRONMENT

Environmental Description: The division occurs throughout temperate and boreal western North America from the Alaska Peninsula and Aleutian Islands south to the Coast Mountains of British Columbia, the Rocky Mountain Cordillera, Cascades, Blue Mountains, Sierra Nevada and other ranges with sufficient elevation to have a temperate (as opposed to desert) climate. Sites range from moderate to steep slopes on bedrock outcrops, cliff faces, narrow canyons, and talus/scree slopes. Overall, these are dry sites, but wetter climate will somewhat ameliorate the site conditions.

*Climate:* The climate is typical of temperate and boreal western North America, with considerable range of temperature and precipitation regimes over the type. Temperature regimes vary from maritime to continental, and from warm to cool.

*Soils/substrate:* On rock outcrops and cliffs, the rock is the dominant substrate, with soil accumulating in cracks or depressions. The small pockets of soil vary in texture and coarse fragments depending upon their genesis. Bedrock types in this division include a full range of geology, including volcanic, igneous (intrusives), sedimentary, and metamorphic bedrock types. In the Cascades and Klamath Mountains thin rocky, ultramafic (peridotite, serpentinite) soils are also common. Scree and talus slopes have surface stones of varying depth and size. They are steep, well-drained sites, with an unstable surface. They may have some soil beneath the rock surface, of varying depth and texture, depending upon bedrock type, slope position, and genesis; however, soil development is limited.

*Biogeography:* Little is known of the nonvascular flora and its distribution on sites of this division. The upland vegetation within the range of this division spans a wide range of vegetation, from coastal rainforests to grasslands, from dry montane woodlands to interior cedar - hemlock forests to subalpine woodlands. As such, the vascular plants associated with communities of this division will differ over the wide range of ecological conditions.

DISTRIBUTION

\*Geographic Range: This division occurs from the Alaska Peninsula and Aleutian Islands, boreal Alaska, south along the Coast Mountains of British Columbia and southeastern Alaska, then east to the Rocky Mountain Cordillera, and south through the Rocky Mountains, Cascades, Sierra Nevada and other ranges, to the mountains of Texas, New Mexico, Arizona, California and northern Mexico, on mountains tall enough to have a temperate climate.

Nations: CA, MX, US

States/Provinces: AB, AK, AZ, BC, CA, CO, ID, MT, MXBC, NM, NV, OR, TX, UT, WA, WY

USFS Ecoregions (2007) [optional]:

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| M887 | Western North American Cliff, Scree & Rock Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2014-11-17 | D050 Mediterranean California Cliff, Scree & Rock Vegetation Division | merged - distinction b/w mediterranean and temerate not sufficeint |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: Faber-Langendoen et al. (2015)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: D. Meidinger

Acknowledgments [optional]: K.A. Schulz

Version Date: 11 Jan 2016

REFERENCES

\*References [Required if used in text]:

Faber-Langendoen, D., J. Drake, S. Gawler, M. Hall, C. Josse, G. Kittel, S. Menard, C. Nordman, M. Pyne, M. Reid, L. Sneddon, K. Schulz, J. Teague, M. Russo, K. Snow, and P. Comer, editors. 2010-2018. Divisions, Macrogroups and Groups for the Revised U.S. National Vegetation Classification. NatureServe, Arlington, VA. plus appendices. [in preparation]

6. Open Rock Vegetation

6.B.1.Nb. Western North American Temperate Cliff, Scree & Rock Vegetation

M887. Western North American Cliff, Scree & Rock Vegetation

Type Concept Sentence: This sparsely vegetated rock outcrop and cliff face macrogroup is found in temperate and boreal climates, on the Alaska peninsula and Aleutian Islands, boreal Alaska and Yukon Territory, the Coast Mountains of British Columbia, in Washington and northwestern Oregon. Stands include patchy vegetated fractures in the rock surface and less steep or more stable slopes that are composed of scattered trees and/or shrubs. Mosses or lichens may be very dense, well-developed and display cover well over 10%.

OVERVIEW

\*Hierarchy Level: Macrogroup

\*Placement in Hierarchy: 6.B.1.Nb. Western North American Temperate Cliff, Scree & Rock Vegetation (D052)

Elcode: M887

\*Scientific Name: *Pseudotsuga menziesii - Pinus ponderosa* / Moss Western North American Cliff, Scree & Rock Vegetation Macrogroup

\*Common (Translated Scientific) Name: Douglas-fir - Ponderosa Pine / Moss Western North American Cliff, Scree & Rock Vegetation Macrogroup

\*Colloquial Name: Western North American Cliff, Scree & Rock Vegetation

\*Type Concept: This type is found throughout temperate and boreal western North America and consists of sparsely vegetated rock outcrops and cliff faces found on the Alaska peninsula, Aleutian Islands, Alaskan boreal region, Coast Mountains of British Columbia, the Rocky Mountain Cordillera, Cascades, Sierra Nevada and other ranges tall enough to have a temperate or boreal climate. The vegetation is highly variable and is typically sparse cover of vascular species with sparse to dense cover of lichens, mosses or other nonvascular organisms. Characteristic species include trees from the surrounding landscape, such as *Abies concolor, Abies lasiocarpa, Abies magnifica, Pinus albicaulis, Pinus contorta, Pinus flexilis, Pinus monticola, Pinus ponderosa, Pseudotsuga menziesii* (not in Alaska), *Populus tremuloides, Tsuga mertensiana*, or *Pinus edulis, Pinus monophylla, Juniperus* spp., and *Cercocarpus ledifolius* at lower elevations. Common shrubs species may include *Amelanchier alnifolia, Arctostaphylos nevadensis, Holodiscus* spp., *Jamesia americana, Juniperus communis, Ledum glandulosum, Mahonia repens, Physocarpus* spp., *Ribes* spp., *Rosa woodsii*, or *Rhus trilobata*. Potential herbaceous species are numerous and may include sparse cover of *Aspidotis densa, Festuca viridula, Poa curtifolia*, and *Pseudoroegneria spicata*. Characteristic nonvascular species information is not available. Stands occur on moderate to steep slopes, cliff faces, narrow canyons, and rock outcrops. In general these are the dry, sparsely vegetated sites. Substrates are often unstable scree and talus that typically occur below cliff faces.

\*Diagnostic Characteristics: Greater than 10% dense covering of mosses and/or nonvascular plants and sparse cover of herbaceous and woody vascular plants on exposed bedrock or talus.

\*Classification Comments: More work is required to delineate a more accurate geographic distribution between lithomorphic macrogroups, which may be better defined by nonvascular species. However, insufficient information is available regarding moss and other nonvascular species information to validate this possibility. Moss and other nonvascular species information is needed. Inclusion of the boreal cliff and rock vegetation here is tentative.

\*Similar NVC Types [if applicable]:

| **Elcode** | **Scientific or Colloquial Name** | **Note** |
| --- | --- | --- |
|  |  |  |

Similar NVC Types General Comments [optional]:

VEGETATION

Physiognomy and Structure Summary: The vegetation is highly variable and is typically sparse cover of vascular species from the surrounding landscape with sparse to dense cover of lichens, mosses or other nonvascular organisms.

Physiognomy and Structure Table [optional]:

| **Physiognomy-Structure Category** | **Prevailing Height (m)** | **Height Range (opt.)** | **Mean % Cover** | **Cover Range (opt.)** |
| --- | --- | --- | --- | --- |
|  |  |  |  | - |

Floristics Summary: The vegetation is highly variable and is typically sparse cover of vascular species from the surrounding landscape with sparse to dense cover of lichens, mosses or other nonvascular organisms. Characteristic trees in Rocky Mountain stands include species from the surrounding landscape, such as *Abies concolor, Abies lasiocarpa, Pinus flexilis, Pinus ponderosa, Populus tremuloides, Pseudotsuga menziesii*, or *Pinus edulis* and *Juniperus* spp. at lower elevations. There may be scattered shrubs present, such as species of *Amelanchier, Holodiscus, Juniperus, Physocarpus, Rhus, Ribes, Rosa*, and *Jamesia americana*, or *Mahonia repens*. Characteristic species at low-elevation sites in the Cascades also include *Pseudotsuga menziesii* and *Pinus ponderosa*, as well as *Pinus monticola* trees with sparse ground cover of *Aspidotis densa, Arctostaphylos nevadensis*, and *Pseudoroegneria spicata*. Higher elevations have *Pinus contorta var. latifolia, Pinus albicaulis, Abies lasiocarpa*, and *Tsuga mertensiana* with *Juniperus communis, Ledum glandulosum, Vaccinium scoparium, Poa curtifolia*, and *Festuca viridula*. Vegetation in the Sierra Nevada and Klamath Mountains may include *Abies magnifica, Pinus contorta var. murrayana, Pinus jeffreyi, Pinus ponderosa, Pseudotsuga menziesii, Populus tremuloides*, or *Pinus monophylla, Juniperus osteosperma*, and *Cercocarpus ledifolius* at lower elevations. There may be shrubs, including species of *Arctostaphylos* or *Ceanothus*. Herbaceous cover is limited. In the northern Cascades to Alaska, scattered stunted trees include *Abies* spp.,  *Callitropsis nootkatensis (= Chamaecyparis nootkatensis)* (not southern range), *Pinus contorta*, Pseudotsuga menziesii (not in Alaska), *Thuja plicata*, or *Tsuga* spp., and the broadleaf tree species *Arbutus menziesii* and *Quercus garryana*. There may be scattered shrubs as well, such as *Acer circinatum, Alnus viridis, Arctostaphylos columbiana, Arctostaphylos uva-ursi, Holodiscus discolor, Ribes* spp., and *Rosa gymnocarpa*. Herbaceous cover is limited and may include species such as *Selaginella wallacei, Polypodium glycyrrhiza, Cryptogramma acrostichoides*, and graminoids such as *Danthonia* spp., *Festuca idahoensis ssp. roemeri (= Festuca roemeri), Koeleria macrantha*, and forbs such as *Collinsia parviflora, Eriophyllum lanatum, Heuchera glabra, Heuchera micrantha, Phlox diffusa, Saxifraga ferruginea, Saxifraga rufidula*, and *Sedum spathulifolium*. Mosses or lichens may be very dense, well-developed and display cover well over 10%. *Amphidium lapponicum, Cladonia portentosa (= Cladina portentosa), Cystocoleus ebeneus, Dicranum scoparium, Polytrichum juniperinum*, and *Racomitrium* spp. are characteristic mosses and lichens in the Georgia Basin. Characteristic moss and nonvascular species information is not available for most of the range of the type. Floristic information was compiled from Hess and Wasser (1982), Kruckeberg (1984), Andrews and Righter (1992), Ecosystems Working Group (1998), Larson et al. (2000a, b), Barbour et al. (2007a), and Sawyer et al. (2009). Boreal composition needs to be described.

\*Floristics Table [Med - High Confidence]:

\*Number of Plots:

\*Cover Scale Used:

| **Physiognomy-Structure Category** | **Taxon Name** | **Specific Growth Form (opt.)** | **Const- ancy** | **Mean % Cover** | **Cover Range (opt.)** | **Differ-ential** | **Diagnostic Combin- ation** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | - |  |  |

Dynamics: Poor soil development, high levels of exposure and steep sites impede the establishment of species from surrounding communities and maintain occurrences of this macrogroup.

ENVIRONMENT

Environmental Description: This type is located throughout temperate and boreal western North America from the Alaska peninsula and Aleutian Islands south to the Coast Mountains of British Columbia, the Rocky Mountain Cordillera, Cascades, Blue Mountains, Sierra Nevada and other ranges tall enough to have a temperate climate. Sites range from moderate to steep slopes, cliff faces, narrow canyons, and rock outcrops. In general these are the dry, sparsely vegetated sites.

*Soil/substrate/hydrology:* Parent material includes outcrops of various igneous (intrusives), sedimentary, and metamorphic bedrock types. In Cascades and Klamath Mountains thin rocky, ultramafic (peridotite, serpentinite) soils are also common. Also included are unstable scree and talus slopes that typically occur below cliff faces. In general these are the dry, sparsely vegetated places. Soil development is limited. Environmental information compiled from Hess and Wasser (1982), Andrews and Righter (1992), Ecosystems Working Group (1998), Larson et al. (2000a, b), Barbour et al. (2007a), and Sawyer et al. (2009).

DISTRIBUTION

\*Geographic Range: This macrogroup is located throughout temperate and boreal western North America on rock outcrops and cliff faces found on the Alaska peninsula, Aleutian Islands and Alaskan boreal, Coast Mountains of British Columbia, the Rocky Mountain Cordillera, Cascades, Sierra Nevada and other ranges tall enough to have a temperate climate.

Nations: CA, MX, US

States/Provinces: AK, BC, CA, OR, WA

USFS Ecoregions (2007) [optional]: 242A:CC, 242B:C?, 313A:CC, 313B:CC, 313D:CC, 315A:CC, 315H:CC, 321A:CC, 322A:??, 331A:C?, 331B:CC, 331D:C?, 331G:CC, 331H:CC, 331I:CP, 331J:CC, 331K:CP, 331N:CP, 341A:CC, 341B:CC, 341C:CC, 341F:CC, 341G:CC, 342B:CC, 342C:CC, 342D:CP, 342E:CC, 342F:CP, 342G:CP, 342H:CP, 342I:CC, 342J:CC, M242A:CC, M242B:CC, M242C:CC, M242D:CC, M261A:CC, M261B:CC, M261D:CC, M261E:CC, M261F:CC, M313A:CC, M313B:CC, M331A:CC, M331B:CC, M331D:CC, M331E:CC, M331F:CC, M331G:CC, M331H:CC, M331I:CC, M331J:CC, M332A:CC, M332B:CC, M332D:CC, M332E:CC, M332F:CC, M332G:CC, M333A:CC, M333B:CC, M333C:CC, M333D:CC, M334A:CC, M341A:CC, M341B:CC

Omernik Ecoregions L3, L4 [optional]:

MLRAs [optional]:

PLOT SAMPLING AND ANALYSIS

\*Plot Analysis Summary [Med - High Confidence]:

\*Plots Used to Define the Type [Med - High Confidence]:

CONFIDENCE LEVEL

USNVC Confidence Level: Moderate

USNVC Confidence Comments [optional]:

HIERARCHY

\*Lower Level NVC Types:

| **Elcode** | **Scientific or Colloquial Name** |
| --- | --- |
| G563 | Californian Cliff, Scree & Rock Vegetation |
| G565 | Rocky Mountain Cliff, Scree & Rock Vegetation |
| G573 | Southern Vancouverian Cliff, Scree & Rock Vegetation |
| G318 | North Vancouverian Montane Bedrock, Cliff & Talus Vegetation |

DISCUSSION

Discussion [optional]:

CONCEPT HISTORY

\*Recent Concept Lineage [if applicable]:

| **Date** | **Predecessor** | **Note** |
| --- | --- | --- |
| 2016-01-12 | M879 North American Boreal Cliff, Scree & Rock Vegetation Macrogroup | M879 split & merged with M887 |

RELATED CONCEPTS

Supporting Concepts [optional]:

| **Relationship to NVC** | **Supporting Concept Name** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

AUTHORSHIP

\*Primary Concept Source [if applicable]: M. Reid, in Faber-Langendoen et al. (2014)

| **Relationship to NVC** | **Name Used in Source** | **Short Citation** | **Note** |
| --- | --- | --- | --- |
|  |  |  |  |

\*Author of Description: K.A. Schulz and G. Kittel

Acknowledgments [optional]:

Version Date: 29 Mar 2017

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