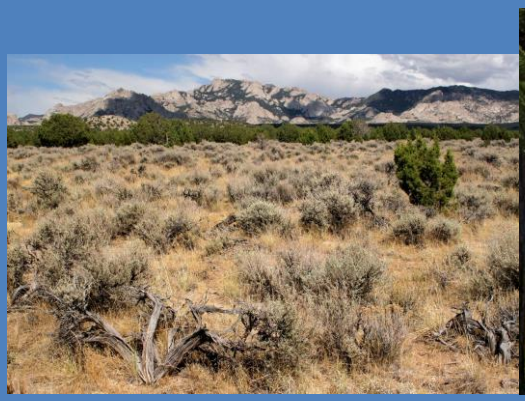
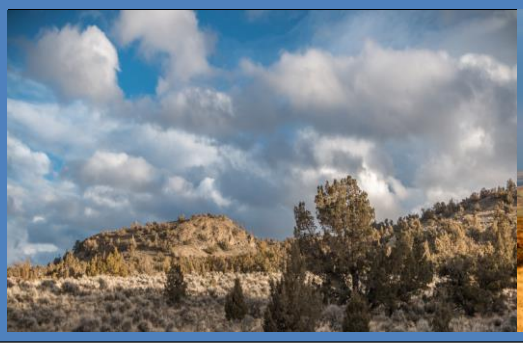
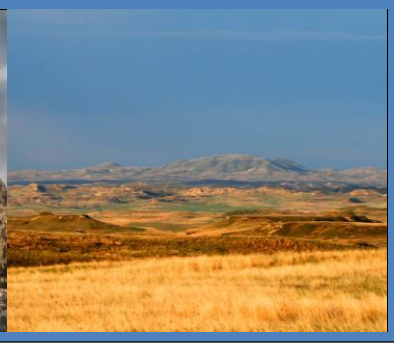
Field Keys to Groups and Alliances in the National Vegetation Classification: Central Basin & Range Ecoregion



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See appendix document: Descriptions_NVC_Groups_Alliances_CentralBasinRange_Nov_2017.pdf

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Introduction and Background

BLM manages extensive lands that support a variety of vegetation types that have been classified and mapped and multiple scales to facilitate resource planning, decision making, and natural resource management. On the ground land managers and biologists need to be able to independently classify these habitats to US National Vegetation Classification (NVC) vegetation types to assess the accuracy of these maps and directly label new AIM vegetation transects while in the field. These new labeled transects can be used to improve the map accuracy, assess ecological condition (ruderal vs natural or semi-natural vegetation), assess fuel loads/fire risk, and target habitats for species of concern for species management.

Field key to vegetation types are an important tool for managers to label vegetation. Dichotomous keys allow field personnel to systematically step through options and arrive at a label for a given geographic area. Field key results are linked to descriptions of each type, which can help confirm result and provide information on range of type, species composition, environmental factors, and ecological processes such as fire, and other information that will assist in resource management and vegetation restoration.

Purpose and Objectives

Across the West, BLM managers are implementing Secretarial Order 3336, to apply new strategies appropriate to conservation and management of sagebrush ecosystems and sage-grouse habitat. The sage-grouse habitat assessment framework (Stiver et al. 2015) and the BLMs Assessment, Inventory and Monitoring strategy (MacKinnon et al. 2011, Toevs et al. 2011, Herrick et al. 2015) have field data collection as components during which a land cover type “label” can be applied to the area being sampled.

Having keys to units in the National Vegetation Classification (NVC; FGDC 2008) for use in the field would provide tools for achieving consistent application of NVC type names to these field samples. Accurately labeled on-the-ground vegetation samples are extremely valuable for a number of applications, e.g. monitoring of rangeland condition by vegetation type, training sites for mapping, inventory of vegetation types found in a management area and identifying particular habitats for species of concern (Reid et al. 2016).

NatureServe ecologists have developed keys for use in the field to the NVC Macrogroups, Groups, and Alliances found in 4 clusters of EPA ecoregions (**Figure 1**): a) Central Basin and Range, b) Northern Great Basin and Range / Columbia Basin, c) Wyoming Basin, and c) Northwestern and Western Great Plains / High Plains (northern portion) (EPA 2013, Omernik 1987).

The keys include the vegetation types most relevant to the BLM, such as sagebrush, pinyon-juniper, semi-desert scrub (e.g. blackbrush, salt desert scrub), lower elevation grasslands, and riparian and wet meadow types. Generally, higher elevation forests and alpine vegetation types were not included, unless of particular interest in one ecoregion (e.g. aspen in the Central Basin and Range) or to clarify contrasting vegetation units.

Project Overview

NatureServe ecologists are well prepared to write field keys such as these. For the original LANDFIRE effort, we developed field keys to ecological systems, organized into clusters of map zones (roughly corresponding to ecoregions). NatureServe is a [artner with the National Park Service’s Vegetation Inventory Program, and has written keys over recent decades for many national park vegetation inventory efforts in the western U.S. (e.g. Cogan et al. 2012, Kearsley et al. 2015), many of them organized by NVC alliances. NatureServe ecologists developed the procedures for assigning of expert labels to plots, in coordination with the LANDFIRE, FIA, USGS and TNC partners. In partnership with LANDFIRE NatureServe staff recently developed keys to automate the labeling of some 400,000 plots in CONUS to NVC Groups (Reid et al. 2014).

The writing of field keys includes the following major tasks:

1) Determine list of NVC Groups and Alliances found in the geography selected for the field key.
2) Compile and review previously written keys for related vegetation (e.g. keys to ecological systems, NPS park units).
3) Review concepts (e.g. descriptions) and criteria used in the LANDFIRE auto-keys to NVC Groups
4) Write the keys to selected NVC Macrogroups, Groups, and Alliances
5) Have someone who did not write the keys conduct a thorough review of the keys
6) Revise keys as necessary

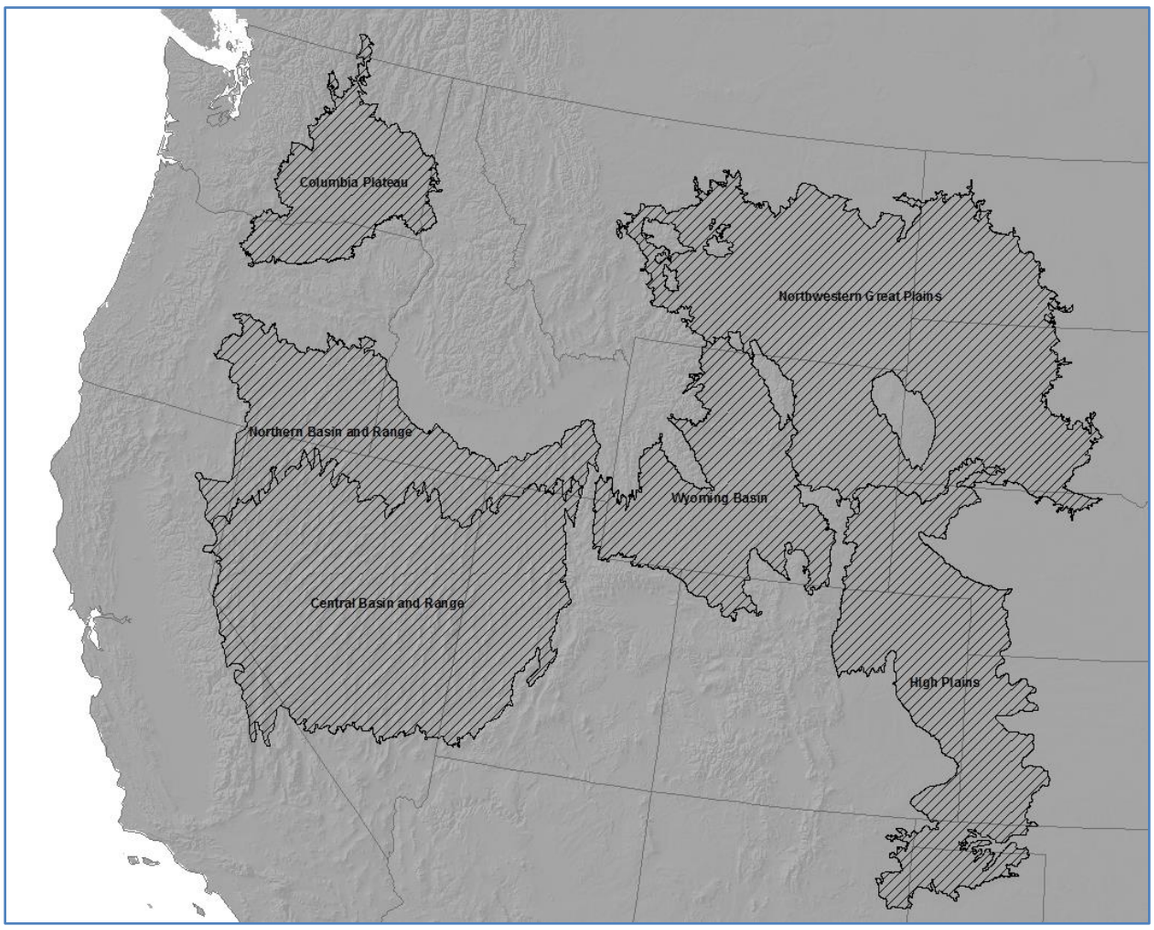

Figure 1. EPA Ecoregions used to organize field keys to the Groups and Alliances of the National Vegetation Classification (NVC) that are found in these ecoregions. NVC types found in the Northern Basin and Range and Columbia Plateau ecoregions were combined into one key. Types found in the northern portion of the High Plains ecoregion were included in the Northwestern Great Plains key.

List of Products

1) Project summary report (this document)
2) Field keys NVC Groups and Alliances found in 4 clusters of EPA ecoregions including:
    a. Central Basin and Range
    b. Northern Basin and Range / Columbia Plateau
    c. Wyoming Basin
    d. Northwestern Great Plains / High Plains (northern portion)
3) Descriptions of NVC Divisions, Macrogroups, Groups and Alliances reported to occur in each EPA ecoregion (Appendices to each ecoregional key, see appendix document Descriptions_NVC_Groups_Alliances_CentralBasinRange_Nov_2017.pdf).

Each ecoregion-based key is a separate document, with the same introductory material (this report & key instructions), but the key itself is different for each ecoregion. Four appendices are provided, one for each ecoregion key, containing the descriptions of the NVC Groups and Alliances included in the relevant ecoregional key.

There is a Table of Contents included for each key, so the user can easily navigate the key itself; and each description appendix also has a Table of Contents to ease finding a description of interest to the key user.

Field Key Design and Instructions for Use

Below we provide information about the NVC hierarchy (an overview), how the keys are organized, definitions for some of the terms used in the keys, and general instructions for how to use them. **We advise the user to read the below sections before attempting to use the keys**.

These field keys are dichotomous and organized using the US National Vegetation Classification (NVC) hierarchy levels for each geographic area. Dichotomous keys are tools that have commonly been used for identifying plants and animals, but can be applied to identifying other things with complex relationships such as vegetation types. "Dichotomous" means the key is organized in a series of pairwise choices of distinguishing characteristics that leads the user to the next pair of choices, or to a conclusion. These pairwise choices are also called *couplets*. Once a vegetation area is keyed, the resulting type name can be cross-checked against a vegetation description to confirm the label for the vegetation type.

NVC Hierarchy

The NVC hierarchy is organized in a strict hierarchical fashion, from broad to finer units in eight, completely nested levels from Class to Association (**Figure 2**). These keys use four of the eight hierarchical levels of the NVC: Division, Macrogroup, Group and Alliance. The mid-levels (Division, Macrogroup, and Group) are based on combinations of diagnostic and dominant plant growth forms, continental to regional differences in mesoclimate, geology, substrates, hydrology and disturbance regimes, and a broad to somewhat narrow set of diagnostic species that represent regional biogeographic differences (**Table 1**). The lower levels (Alliance) are based primarily on floristics, including a narrow range of characteristic species, diagnostic species, and some sub-regional environmental factors (Faber-langendoen et al. 2007, FGDC 2008, Faber-Langendoen et al. 2014; see www.usnvc.org to explore the full hierarchy and access descriptions of units).

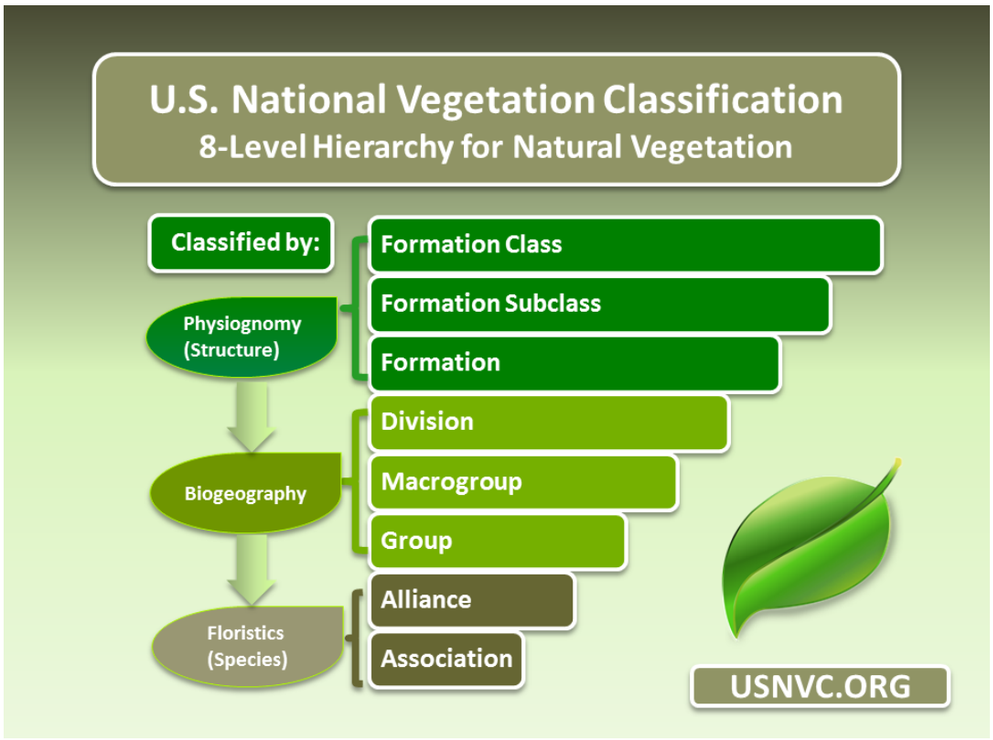

Figure 2. Summary of the primary criteria used to define the various levels of the USNVC.

Natural, Ruderal and Cultural Vegetation

One of the more distinctive features of the USNVC is that it includes both natural vegetation, which establishes spontaneously and is shaped partly or strongly by ecological processes, and cultural vegetation, which is typically planted and strongly shaped by anthropogenic processes, e.g., corn fields or golf courses). By including all vegetation types in a consistent framework, land managers and others can address issues such as wildfire regimes, pest infestations, exotic species invasions, successional changes, and conversion to farms or homes. In addition, the comprehensive approach of the USNVC classification enables an 'all lands approach,' which several government agencies use to ensure that their agency-specific land management planning takes place in the context of the larger landscape.

Natural vegetation is composed predominantly of spontaneously growing sets of plant species with composition shaped by both abiotic (site) and biotic processes; these are vegetation types whose species composition is primarily determined by non-human ecological processes (Küchler 1969, Westhoff and van der Maarel 1973, van der Maarel 2005). Although natural vegetation is variously affected by human activities (e.g., logging, livestock grazing, fire, introduced pathogens), it retains a distinctive set of spontaneous vegetation and ecological characteristics (Westhoff and van der Maarel 1973, Di Gregorio and Jansen 1996). It includes both near-natural and ruderal vegetation (see below). ***Natural vegetation types <u>are</u> included in the keys provided here.***

Ruderal vegetation includes the more distinctive invasive and weedy vegetation types; that is, those with no apparent historical natural analogs, sometimes referred to as "novel" or "emerging" ecosystems (Hobbs et al. 2006, Belnap et al. 2012). Within the NVC this vegetation is referred to as ruderal; that is "vegetation found on human-disturbed sites, with no apparent recent historical natural analogs, and whose current composition and structure (1) is not a function of continuous cultivation by humans and (2) includes a broadly distinctive characteristic species combination, whether tree, shrub or herb dominated. The vegetation is often comprised of invasive species, whether exotic or native, that have expanded in extent and abundance due to human disturbances" (Curtis 1959, Ellenberg 1988, Lincoln et al. 1998). ***Ruderal vegetation types <u>are</u> included in the keys provided here.***

Cultural Vegetation Hierarchy

The **Cultural vegetation hierarchy** is organized by type of human manipulation at the top four, broadest levels, including distinctions between agricultural lands, reclaimed farmlands, and urban lawns and parks. The two mid-levels are defined by climate, plant taxa, and specifics of human manipulations, such as temperate row crops and hayfields or tropical orchards. The lowest two levels are defined by the most common species and appearance, describing sweet corn or banana crops, for example. Definitions and examples of the cultural hierarchy are provided in FGDC (2008) and Faber-Langendoen et al. (2014). ***Cultural vegetation types <u>are not</u> included in the keys provided here***.

Table 1. Levels, definition and example of the hierarchy for natural vegetation**.** The name of the level can be added to the type name for clarity, where needed.

Natural Hierarchy		Definition	Example
Upper	L1 – Formation Class	A vegetation type defined by broad combinations of dominant general growth forms adapted to basic moisture, temperature, and/or substrate or aquatic conditions.	**Colloquial Name:** Desert & Semi-Desert **Scientific Name:** Xeromorphic Woodland, Scrub & Herb Vegetation **Code:** 3.
	L2 – Formation Subclass	A vegetation type defined by a combination of general dominant and diagnostic growth forms that reflect global mega- or macroclimatic factors driven primarily by latitude and continental position, or that reflect overriding substrate or aquatic conditions.	**Colloquial Name:** Cool Semi-Desert Scrub & Grassland **Scientific Name:** Cool Semi-Desert Scrub & Grassland **Code:** 3.B.
	L3 – Formation	A vegetation type defined by combinations of dominant and diagnostic growth forms that reflect global macroclimatic conditions as modified by altitude, seasonality of precipitation, substrates, and hydrologic conditions.	**Colloquial Name:** Cool Semi-Desert Scrub & Grassland **Scientific Name:** Cool Semi-Desert Scrub & Grassland **Code:** 3.B.1.
Mid	L4 – Division	A vegetation type defined by combinations of dominant and diagnostic growth forms and a broad set of diagnostic plant species that reflect biogeographic differences in composition and continental differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.	**Colloquial Name:** Western North American Cool Semi-Desert Scrub & Grassland **Scientific Name:** *Artemisia tridentata - Atriplex confertifolia / Hesperostipa comata* Cool Semi-Desert Scrub & Grassland **Code:** D040

Natural Hierarchy		Definition	Example
	L5 – Macrogroup	A vegetation type defined by moderate sets of diagnostic plant species and diagnostic growth forms that reflect biogeographic difference in composition and sub-continental to regional mesoclimate, geology, substrates, hydrology, and disturbance regimes.	**Colloquial Name:** Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland **Scientific Name:** *Artemisia tridentata - Artemisia tripartita ssp. tripartita - Purshia tridentata* Steppe & Shrubland **Code:** M169
	L6 – Group	A vegetation type defined by a relatively narrow set of diagnostic plant species (including dominants and co-dominants), broadly similar composition, and diagnostic growth forms that reflect regional mesoclimate, geology, substrates, hydrology, and disturbance regimes.	**Colloquial Name:** Intermountain Dry Tall Sagebrush Steppe & Shrubland **Scientific Name:** *Artemisia tridentata ssp. wyomingensis - Artemisia tridentata ssp. tridentata* Steppe & Shrubland **Code:** G303
Lower	L7 – Alliance	A vegetation type defined by a characteristic range of species composition, habitat conditions, physiognomy, and diagnostic species, typically at least one of which is found in the uppermost or dominant stratum of the vegetation. Alliances reflect regional to subregional climate, substrates, hydrology, moisture/nutrient factors, and disturbance regimes.	**Colloquial Name:** Wyoming Big Sagebrush Dry Shrubland **Scientific Name:** *Artemisia tridentata ssp. wyomingensis* Dry Steppe & Shrubland **Code:** A3184
	L8 – Association	A vegetation type defined by a characteristic range of species composition, diagnostic species occurrence, habitat conditions and physiognomy. Associations reflect subregional to local topo-edaphic factors of substrates, hydrology, disturbance regimes and climate.	**Colloquial Name:** Wyoming Big Sagebrush / Indian Ricegrass Shrubland **Scientific Name:** *Artemisia tridentata ssp. wyomingensis / Achnatherum hymenoides* Shrubland **Code:** CEGL001046

Use in Field

The key is designed to assist users in identifying Division, Macrogroup, Group and Alliance level units in the field. The NVC vegetation unit concepts are robust, but still constructed from available field data so may not account for all types occurring within the sample area, nor explain the full range of variation of all vegetation types as they appear on the ground.

For each geographic area there is a field key to each the NVC units occurring in that Division in that area. Knowing the Division, the user can choose one of two keys to lower level units; one for upland divisions and one for riparian or wetland divisions. These secondary keys are to Macrogroup, Group and Alliance within a given Division. First vegetation is keyed to NVC Division, then depending on the division, one keys further in either the upland or the riparian and wetland key to determine Macrogroup, Group and Alliance units.

In time, field crews will be able to identify vegetation to Division without the Division Key and will be able to go directly to the appropriate secondary key. Indeed, many users will be able to go directly to the Macrogroup or Group section of the key, once familiar with the hierarchical structure of the keys and the vegetation within a region.

The Key to NVC Divisions is defined by the physiognomy of the vegetation, i.e., Forest/ Woodland, Shrubland/Shrub Steppe (shrub herbaceous), Herbaceous (graminoid or forb dominated) and Sparse vegetation. The second level (Macrogroup, Group and Alliance) focuses on the dominant and diagnostic species' canopy cover and to a lesser extent, habitat or elevation zone. Also important are geographic range of occurrence and specific environmental variables such as a sandy substrates for sand deposit vegetation types.

For use in the field there are several assumptions regarding use of keys:

1) The area being keyed is a homogeneous section of vegetation. Be aware that transects may sample ecotones or may cross from one type of vegetation into another. When a transect crosses a boundary, it may need to be keyed for each homogeneous section within the transect. Transects sampling transitional vegetation in ecotones is problematic as it may not key or key to multiple vegetation types.

2) Percent cover in the key refers to absolute canopy cover, not foliar cover and not relative cover, unless specified in key couplet.

3) Once you have made your selection of a vegetation type based on the key, always read the description; if it appears to be a poor fit, make a note of it and flag the data sheet for further expert review.

Use in the office

Plot data has the same assumptions and limitations of using a key in the field; this key assumes the unit being keyed is homogenous. It may not be possible to separate out homogenous sections if transects cross into a second type of vegetation. Also the landscape context is lost so without notes from field crews, it is difficult to determine if sampled vegetation has been disturbed or otherwise altered so that it does not represent the natural conditions, or if the vegetation is transitional (ecotonal) without a clear difference between two adjacent vegetation types.

Key Instructions

These dichotomous keys are organized by the hierarchical units of the US National Vegetation Classification (NVC) Units. Keying is done in a two-step process starting with the broader Key to Divisions, then moving to separate keys to other mid-level units (Macrogroup and Group) and the lower level unit (Alliance). The Key to Divisions will result in a division level unit such as D040 Western North American Cool Semi-Desert Scrub & Grassland. Then the user goes to the Table of Contents to find the desired key for that division. Division keys will key vegetation in a nested fashion to the Macrogroups, Groups and Alliances that occur within the geographic area of the key.

These Division Keys are organized in the Table of Contents hierarchically in two groups:

A) Keys to USNVC Upland Macrogroups, Groups and Alliances in the Central Basin and Range Ecoregion in the Western US and

B) Key to USNVC Wetland and Riparian Macrogroups, Groups and Alliances in the Central Basin and Range Ecoregion in the Western US.

Numbering in these keys is organized by the NVC hierarchy. Couplets are paired 1a and 1b, to be read as 1a criteria versus 1b criteria. The key is completely nested and starts with the macrogroup couplets, which are numbered as "M"; e.g. M1a, M1b, M2a, M2b, etc.), then group couplets (numbered "G"; e.g. G1a, G1b, G2a, G2b, etc.) and finally alliance couplets (numbered "A"; e.g. A1a, A1b, A2a, A2b, etc.). The Key to Divisions is numbered similarly with "D" for each couplet: e.g. D1a, D1b, D2a, D2b, etc.).

In some cases, there are couplets for additional Macrogroups, Groups and Alliances that are not known from the specific ecoregion but have been included for reference purposes to contrast with the corresponding types. These NVC units are noted with an "*" at the end of the name of the unit.

When using this strictly nested key, if you come to a dead end or to alliances that do not represent the vegetation you are keying, it is important to verify that you correctly keyed to Division, Macrogroup and Group levels. The upper levels of the hierarchy are biogeographically influenced so vegetation dominated by similar, widespread species can occur in multiple alliances. For example, *Artemisia tridentata* (big sagebrush) occurs in multiple alliances as do widespread grasses such as *Pseudoroegneria spicata* (bluebunch wheatgrass). Also, some of the widespread Alliances were placed in Groups as a "best fit" regionally and it is possible to have "outliers" from adjacent regions e.g., Mojave Mid-Elevation Mixed Desert Scrub Group in the southern Great Basin. Therefore, it is essential to verify your initial results from the key by trying alternative similar couplets in the upper levels of the hierarchy.

In addition to the key, you will be provided full descriptions of vegetation units at the Division, Macrogroup, Group and Alliance levels. Please read the description of units to verify your key result is correct. Some NVC units are somewhat heterogeneous and may include vegetation that differs from a generalized concept, but these are often clearly addressed in the descriptions. Not all species that distinguish each Group or Alliance could be listed in the couplets; the descriptions are much more complete.

Definitions for use in keys (see Faber-Langendoen et al. 2016 for an extensive list of growth-form terms):

Definitions of Terms used in Key to NVC Divisions

Cryomorphic — Pertaining to plants having structural or functional adaptations to survive cold temperatures and resist frost damage (e.g., alpine creeping dwarfshrubs, krummholz).

Cryptogam — A plant that produces by spores or gametes rather than seed, i.e. an alga, bryophyte or pteridophyte (fern). For vegetation purposes, often extended to include lichen, which are comprised of a fungus and an alga. Often a component of biological soil crust.

Hydromorphic — Pertaining to plants having structural or functional adaptations for living in water-dominated or aquatic habitats (adapted from FGDC 1997 and Lincoln and others 1998).

Lithomorphic — Pertaining to plants, especially cryptogams, having structural or functional adaptations for living on rock surfaces or in rocky substrates (i.e. particle sizes larger than 2 mm diameter) or very hard surfaces, such as dense clay badlands (adapted from Lincoln and others 1998).

Mesomorphic — Pertaining to plants requiring environmental conditions of moderate moisture and temperature or which are only partially protected against desiccation (adapted from Lincoln and others 1998).

Scleromorphic— Pertaining to plants that have hard leaves, short internodes and leaf orientation parallel or oblique to direct sunlight.

Xeromorphic — Pertaining to plants having structural or functional adaptations to prevent water loss by evaporation (Lincoln and others 1998). Xeromorphic growth forms include succulent (e.g., cacti, euphorbias) and small-leaved shrubs and trees.

Examples:

- Mesomorphic Tree Vegetation (Forest & Woodland)
- Mesomorphic Shrub & Herb Vegetation (Shrub & Herb Vegetation)
- Xeromorphic Woodland, Scrub & Herb Vegetation (Desert & Semi-Desert)
- Hydromorphic Vegetation (Aquatic Vegetation)

Definitions of Terms used in Keys to NVC Macrogroups, Groups, and Alliances

Tree - A woody plant that generally has a single main stem and a more or less definite crown. In instances where growth form cannot be readily determined, woody plants equal to or greater than 5 m in height at maturity are to be considered trees (adapted from FGDC 1997). Excludes krummholz (wind-stunted trees), but includes small trees or "treelets" (Box 1981). Tall multi-stemmed woody plants with strong canopy structure and that will exceed 5 m would be included here (e.g. mature, multi-stemmed *Juniperus osteosperma, Cercocarpus ledifolia* in the United States). Also includes Cactaceae, *Carnegia gigantea* (saguaro), Agavaceae, *Yucca brevifolia* (Joshua trees), and other species over 5 meters in height at maturity.

Shrub - A woody plant that generally has several erect, spreading, or prostrate stems that give it a bushy appearance. In instances where growth form cannot be readily determined, woody plants less than 5 m in height at maturity are to be considered shrubs (adapted from FGDC 1997). Includes krummholz (wind-stunted trees), but excludes small trees (Box 1981). Includes dwarf-shrubs (less than 30 cm), low or short woody vines, and arborescents (woody plants that branch at or near ground-level but grow to low tree heights) (Box 1981). Includes cacti less than 5 meters in height at maturity. Includes both the "Typical Stem succulents" and "Bush succulents" (Box 1981), *Agave* and *Yucca*. Some multi-stemmed, bushy woody species ("scrub") that reach up to 10 m may be included here, such as *Quercus gambelii* (Gambel oak) or riparian scrub *Alnus incana* (gray alder) and *Alnus viridis* (green alder).

Herb - A vascular, non-woody plant without perennial aboveground woody stems, with perennating buds borne at or below the ground surface. (Whittaker 1975, FGDC 1997). Includes forbs (both flowering forbs and spore-bearing vascular plants), graminoids, and herbaceous vines.

Nonvascular - A plant or plant-like organism without specialized water or fluid conductive tissue (xylem and phloem). Includes mosses, liverworts, hornworts, lichens, and algae (adapted from FGDC 1997). Also called thallophytes or "nonvascular cryptogams," (that is, excluding the vascular cryptogams; see Herb) (Box 1981).

Epiphyte - A vascular or nonvascular plant that grows by germinating and rooting on other plants or other perched structures, and does not root in the ground (adapted from FGDC 1997).

Liana - A woody, climbing plant that begins life as terrestrial seedlings but relies on external structural support for height growth during some part of its life (Gerwing 2004), typically exceeding 5 m in height or length at maturity. Non-woody climbers are treated as "Herb."

Other tips for using field keys.

1. If area of interest is in a transition zone between wetland and upland, try keying as both upland and wetland/riparian sections of the key. In general Upland Vegetation is influenced only by precipitation, whereas vegetation of wetlands, riparian areas, playas, and/or mudflats is influenced by accumulated runoff, groundwater, impounded water, seasonal flooding, or any source of moisture in addition to precipitation.

2. You are observing vegetation that you think is an herbaceous or shrubland community, but it has some tree cover. In this case, try keying the vegetation through the woodland key as well as the herbaceous or shrubland key. In general with any layer, if it does not cover at least 8% (tree layer) or 5% (shrub or herbaceous layers), it is ignored. The exception is in very sparse communities (see #5 below).

3. The diagnostic layer consists of woody plants that may appear in either a shrub or a tree form, depending on site conditions and age. These species include *Pinus monophylla, Juniperus osteosperma,* and *Cercocarpus ledifolius*. In this key, these species are considered to be evergreen trees, regardless of their height or growth form. For example *Cercocarpus ledifolius* Scrub Alliance is keyed in a woodland division: D010 Western North American Pinyon - Juniper Woodland & Scrub

4. Big sagebrush (*Artemisia tridentata*) needs to be identified to subspecies because different subspecies are characteristic of different Groups. For example *Artemisia tridentata* ssp. *vaseyana* is diagnostic of Intermountain Mountain Big Sagebrush Steppe & Shrubland (G304) that occurs at montane and subalpine elevations. In general, subspecies of other *Artemisia* taxa are also necessary to correctly key to Alliance (e.g. subspecies of *A. arbuscula* and *A. cana*).

5. Sparsely vegetated communities are defined as having total vascular plant cover of 2-10% (sometimes a little more given the range of natural variation) and are often a mix of woody and herbaceous plants with nothing dominant or diagnostic. In some stands cover of non-vascular organisms such as lichen and moss may actually dominate these communities. Sparsely vegetated areas are typically heterogeneous and can be difficult to key. Borderline "sparsely" vegetated stands should always be run through multiple keys because even though they may not fall clearly into a woodland, shrubland or herbaceous category, they may actually be non-sparse communities (e.g.

the natural variation of some of the non-sparse vegetation types approaches 10% total vascular plant cover and may range below). This is especially true for shrubland and dwarf-shrubland associations that occur in harsh habitats such as deserts or alpine areas. Go by dominance rather than absolute cover measurements.

6. Mixed evergreen – deciduous (aspen) forests and woodlands generally have 25-75% relative tree canopy cover of both conifers and aspen. Aspen stands generally have <25% relative tree canopy cover of conifer trees and conifer stands have <25% relative tree canopy cover of aspen. Be sure to consider the full Minimum Mapping Unit (MMU) observation area in case the point lands near a small patch inclusion.
7. Focus on the perennial species in the community unless the community or layer consists almost entirely of annuals or ephemerals or is highly disturbed or degraded.
8. The NVC does not weight all species as contributing equally to a classification. Species vary in their degree of habitat specialization. To a point, the more specialized and constant a species (high fidelity), the more it is likely to be a "diagnostic" species that controls the assignment of a community to an association. Generalist species such as *Ephedra viridis, Ericameria nauseosa, Gutierrezia sarothrae, Poa secunda, Opuntia* spp. are only considered diagnostic if they are overwhelmingly dominant. For example, if you are in a pinyon - juniper woodland with about equal cover of *Cercocarpus ledifolius* and *Artemisia tridentata,* it will be classified as *Pinus monophylla - Juniperus osteosperma / Cercocarpus ledifolius* Woodland, not *Pinus monophylla - Juniperus osteosperma / Artemisia tridentata* Woodland. Weak indicator species generally are not used to classify unless strongly dominant.

Some examples of such diagnostic considerations from the interior western US include:

Subalpine trees: *Pinus longaeva > Picea engelmannii > Pinus flexilis > Populus tremuloides*

Montane trees: *Pinus ponderosa > Abies concolor > Pseudotsuga menziesii > Populus tremuloides*, although this will differ among seral stands versus persistent stands.

Rock outcrop shrubs: *Cercocarpus ledifolius > Cercocarpus intricatus > Peraphyllum ramosissimum, Glossopetalon spinescens > Artemisia tridentata > Ephedra viridis*

Upland shrubs: *Artemisia arbuscula, Artemisia nova > Artemisia tridentata* ssp*. vaseyana > A. t.* ssp*. tridentata > Amelanchier utahensis > Purshia tridentata > Symphoricarpos oreophilus*

Shrub in alluvial fans, alluvial flats and terraces: *Sarcobatus vermiculatus > Artemisia tridentata* ssp. *tridentata > A. t.* ssp*. wyomingensis > Ericameria nauseosa*

Grasses, Strong indicators: *Leymus cinereus, Elymus trachycaulus, Pseudoroegneria spicata, Achnatherum lettermanii, Hesperostipa comata,* **Medium***: Pleuraphis jamesii, Achnatherum hymenoides, Poa fendleriana.* **Weak***: Poa secunda, Elymus elymoides, Aristida* spp.*, Sporobolus cryptandrus, Bromus inermis, Poa pratensis, Bromus tectorum*.

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Keys to USNVC Divisions, Macrogroups, Groups and Alliances in the Central Basin and Range Ecoregion

November 2017, NatureServe, Boulder, CO

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* Indicates that NVC unit is peripheral to the CBR key area and may not be present.

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Introduction

This is a field key of eight upland and five wetland/riparian divisions from the Central Basin and Range ecoregion, and the National Vegetation Classification units (Macrogroups, Groups and Alliances) in those divisions.

NatureServe ecologists have developed keys for use in the field to the NVC Macrogroups, Groups, and Alliances found in 4 clusters of US EPA ecoregions: the Central Basin and Range, the Northern Basin and Range and the Columbia Plateau, the Wyoming Basin, and the Northwestern Great Plains and the High Plains (northern portion).

These field keys are dichotomous and organized using the National Vegetation Classification (NVC) hierarchy levels for each geographic area. Dichotomous keys are tools that have commonly been used to identify plants and animals, but can be applied to identifying other things with complex relationships such as vegetation types. Dichotomous means the key is organized in series of steps, each with two choices of distinguishing characteristics that leads to a conclusion.

The NVC hierarchy is organized in hierarchical fashion, from broad to finer units in eight, completely nested, levels from Class to Association. These keys use four of the eight hierarchical levels of the NVC: Division, Macrogroup, Group and Alliance. The mid levels (Division, Macrogroup, and Group) are based on combinations of diagnostic and dominant growth forms, continental to regional differences in mesoclimate, geology, substrates, hydrology and disturbance regimes, and a broad to somewhat narrow set of diagnostic species that represent regional biogeographic differences. The lower levels (Alliance) are based primarily on floristics, including a narrow range of characteristic species, diagnostic species, and some subregional environmental factors (Faber-langendoen et al. 2007, FGDC 2008).

The keys include the vegetation types most relevant to the BLM, such as sagebrush, pinyon-juniper, semi-desert scrub (e.g. blackbrush, salt desert scrub), lower elevation grasslands, and riparian and wet meadow types. Generally, higher elevation forests and alpine vegetation types are not included, unless of particular interest in one ecoregion (e.g. aspen in the Central Great Basin) or to clarify contrasting vegetation units.

The keys are designed to assist users in identifying Division, Macrogroup, Group and Alliance level units in the field. The NVC vegetation unit concepts are robust, but still constructed from available field data and what is currently known about distribution, so may not account for all types occurring within the sample area, nor explain the full range of variation of all vegetation types as they appear on the ground.

The key has two levels; the first level Division Key is defined by the physiognomy of the vegetation, i.e., Forest/ Woodland, Shrubland/Shrub Steppe (shrub herbaceous), Herbaceous (graminoid or forb dominated) and Sparse vegetation. The Division Key determines appropriate Division. The second level (Upland and Wetland/Riparian key) focuses on the dominant and diagnostic species' canopy cover and to a lesser extent, habitat or elevation zone, and provides the keys to Macrogroups, Groups and Alliances within the Division. Also important are geographic range of occurrence and specific environmental variables such as a sandy substrates for sand deposit vegetation types. Once the user has keyed to a Division, then the Table of Contents is used to link to that Division within a portion of the Upland or Wetland/riparian key.

For more information about the structure and content of the keys, how to use them, and definitions of some terms used in the keys, see the report accompanying this key (above, in section **Field Key Design and Instructions for Use**).

Key to USNVC Divisions in the Western US

The division key includes all divisions found in the western U.S.; one or more of the divisions may not occur in the region represented in the main body of the keys; these are indicated by an * after the name of the division.

D1a. Vegetation of rocky or rock-like habitats, including outcrops, cliffs, talus, or scree. Cryptogam vegetation tends to dominate, with vascular plant species of low cover (less than 10%). **D2**
D1b. Vascular vegetation present with 10% or greater cover and not like above in all respects. **D3**

D2a. 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 generally west of the 100th Meridian. Cryptogam vegetation tends to dominate, with vascular plants species of low cover. ..... **.....D052 Western North American Temperate & Boreal Cliff, Scree & Rock Vegetation**
D2b. Vegetation of eastern and boreal North America generally east of the 100th Meridian 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 (does not occur in CBR).... **.....D051 Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation ***

D3a. Tree-dominated vegetation of tropical, temperate and boreal regions, characterized by broadly mesomorphic (including scleromorphic) tree growth forms, including broad-leaved, needle-leaved, sclerophyllous, palm, bamboo trees, and tree ferns, with at least 10 percent cover. Includes humid to seasonally dry tropical to boreal and subalpine climates; wet to dry substrate conditions. Includes native, managed and some plantation forests where human management is infrequent. **D5**
D3b. Vegetation not like above in all respects **D4**

D4a. 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), typically with <10% mesomorphic tree cover (but see discussion of tropical grasslands and savannas above), tropical to boreal and subalpine climates, wet to dry substrate conditions. **D12**
D4b. 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, can be open to very sparse, including very open sandy and rocky vegetation with xeromorphic growth forms. **D20**

D5a. Treed vegetation of uplands **D6**
D5b. Treed vegetation of wetlands (site periodically) or riparian areas that have a high water tables nearby that plants can access (riparian). **D9**

D6a. Vegetation dominated by Pinyon and Juniper species. ..... **.....D010 Western North American Pinyon - Juniper Woodland & Scrub**
D6b. Forests not as above **D7**

D7a. Forests or woodlands of aspen, oak and mixed hardwoods found throughout the Great Plains, from central Kansas to the Canadian aspen parkland region. ..... **..... D326 North American Great Plains Forest & Woodland ***
D7b. Forests not as above **D8**

D8a. Forests and woodlands in the cool maritime temperate climates of western North America characterized by conifers such as *Abies amabilis, Abies grandis, Abies concolor var. lowiana, Abies magnifica, Abies procera, Calocedrus decurrens, Chamaecyparis 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; or broadleaf trees Acer macrophyllum, Alnus rubra, Arbutus menziesii, Lithocarpus densiflorus, Quercus chrysolepis*, and *Quercus kelloggii*.**.....D192 Vancouverian Forest & Woodland ***
D8b. Forests, woodlands and savannas of the mountains of 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 engelmannii x glauca* hybrids, *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*. Associated deciduous hardwoods are infrequent and include

Acer grandidentatum, Betula papyrifera, and *Populus tremuloides*. **... D194 Rocky Mountain Forest & Woodland**

D9a. 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), across much of cool-temperate eastern North America. ..... **..... D011 Eastern North American-Great Plains Flooded & Swamp Forest ***

D9b. Wetland or riparian forests not like above **D10a**

D10a. Forested riparian and depressional wetlands dominated by broad-leaved deciduous trees or conifers (or both); at mid to high elevations of the Rocky Mountains, ranges of the Intermountain West, the Colorado Plateau, the Sierra Nevada and eastern Cascades. ..... **..... D195 Rocky Mountain-Great Basin Montane Flooded & Swamp Forest**

D10b. Wetland or riparian forests not like above **D11**

D11a. Forested wetlands of temperate maritime climates from southern Alaska to northern California, including riparian forests, rich swamps, and poor peat swamps. Lowland riparian forests characterized by broad-leaf *Acer macrophyllum, Alnus rubra, Populus balsamifera ssp. trichocarpa, Salix lucida ssp. lasiandra* or *Fraxinus latifolia* (in southern part of range), or conifers including *Abies grandis, Picea sitchensis* or *Thuja plicata*. Montane riparian areas generally conifer-dominated, species include *Abies amabilis, Abies concolor, Abies magnifica, Pinus contorta var. murrayana, Populus tremuloides*, and/or *Tsuga mertensiana*. **.... D193 Vancouverian Flooded & Swamp Forest ***

D11b. Lowland riparian forests and woodlands dominated by broad-leaved deciduous trees (cottonwoods (*Populus*), sycamores (*Platanus*, and hackberries (*Celtis*)) and palms (*Washingtonia*) 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. ..... **..... D013 Western North American Interior Flooded Forest**

D12a. Shrub- and herb-dominated vegetation of uplands **D13**

D12b. Shrub- and herb-dominated vegetation of wetlands and riparian areas **D16**

D13a. Vegetation of the central plains of North America, predominately grasslands commonly referred to as shortgrass, mixedgrass and tallgrass prairie, interspersed with evergreen and deciduous shrublands. Found on glaciated or non-glaciated substrates, rolling to rugged topography, and fine-textured to coarse-textured soils. **..... D023 Central North American Grassland & Shrubland ***

D13b. Vegetation not like above in all respects **D14**

D14a. Chaparral shrublands occurring between low-elevation desert landscapes and higher subalpine woodlands of the western U.S. and northern Mexico. Characteristic genera include *Arctostaphylos, Ceanothus, Cercocarpus*, and *Quercus*. **.....D061 Western North American Interior Chaparral**

D14b. Vegetation not like above in all respects **D15**

D15a. Lowland to subalpine shrubland, grassland, and meadow communities in temperate mountainous regions of western North America, dominated by cold-deciduous shrubs, cool-season bunchgrasses or mesic forbs. 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*, among many others. See description for all diagnostic species. **..... ..... D022 Western North American Grassland & Shrubland**

D15b. 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. Characteristic genera include *Adenostoma, Arctostaphylos, Artemisia, Baccharis, Ceanothus, Eriogonum, Frangula, Malosma, Nassella, Quercus, Rhus*, and *Salvia*. For dominant species see full description. ..... **.....D327 Californian Scrub & Grassland**

D16a. 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. ..... **..... D029 North American Bog & Fen**

D16b. Wetlands or riparian areas not like above in all respects **D17**

D17a. Freshwater wetlands **D18**

* Indicates that NVC unit is peripheral to the CBR key area and may not be present.

D17b. Alkaline, saline or brackish wetlands **D19**

D18a. 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 southern boreal latitudes of western North America. .....
D031 Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

D18b. Vegetation in eastern cool-temperate and boreal North America, including the Great Plains. Dominated by shrubs or non-hydromorphic herbaceous plants that are facultatively to obligately adapted to freshwater wetland conditions; in mineral or mucky organic soils with regular (intermittent to permanent) saturated and flooded conditions.....
D323 Eastern North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland*

D19a. Brackish marsh and saline wet meadows found along shallow lakes and basins and surrounding areas across the Great Plains of North America. **... D033 North American Great Plains Saline Marsh ***

D19b. 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.**... D036 North American Western Interior Brackish Marsh, Playa & Shrubland**

D20a. 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. Characteristic genera include *Ambrosia* (ambrosia), *Acacia* (acacia), *Agave* (agave), *Bouteloua* (grama), *Carnegiea* (saguaro), *Dasylirion* (sotal), *Flourensia* (tarbush), *Fouquieria* (ocatillo), *Larrea* (creosotebush), *Muhlenbergia* (muhlysotal), *Olneya* (ironwood), *Parkinsonia* (paloverde), *Pleuraphis*, and *Prosopis* (mesquite). Ruderal vegetation dominated by non-native taxa (e.g., *Brassica nigra* (black mustard*), Brassica tournefortii* (Asian mustard)*, Bromus madritensis* (compact brome), *Bromus rubens* (red brome), *Eragrostis lehmanniana* (Lehmann's lovegrass), and *Schismus barbatus* (common Mediterranean grass) are also included. ..... **D039 North American Warm Desert Scrub & Grassland**

D20b. Shrublands, shrub-steppe and grasslands within cool semi-desert climates of western North America. Includes shrublands dominated by *Artemisia tridentata, Atriplex* spp., *Yucca* spp., *Nolina* spp., *Buddleja, Coleogyne, Ephedra, Ericameria, Mortonia, Poliomintha,* etc.) Grasslands taxa are predominantly cool-season species, including *Achnatherum, Hesperostipa, Poa, Festuca, Elymus, Leymus, Pascopyrum*, and *Pseudoroegneria*. Warm-season grass genera (e.g., *Pleuraphis, Bouteloua,* and *Muhlenbergia*) are important in the southern areas. Ruderal grasslands or forblands dominated by non-native Eurasian taxa (e.g., *Bromus tectorum, Acroptilon repens, Isatis tinctoria, Sisymbrium* spp., *Taeniatherum caput-medusae*) and *Agropyron cristatum*) are also included **..... ..... D040 Western North American Cool Semi-Desert Scrub & Grassland**

* Indicates that NVC unit is peripheral to the CBR key area and may not be present.

Key to USNVC Upland Macrogroups, Groups and Alliances in the Central Basin and Range Ecoregion (Selected Divisions)

1.B.2 Cool Temperate Forest & Woodland

D194 Rocky Mountain Forest & Woodland

M1a. Macrogroup of high montane and subalpine forests/woodlands in mountainous regions of the western U.S. and southwestern Canada. Characteristic trees include *Abies lasiocarpa* (subalpine fir), *Larix lyallii* (subalpine larch), *Picea engelmannii* (Engelmann spruce), *Pinus albicaulis* (whitebark pine), *Pinus aristata* (bristlecone pine), *Pinus contorta* (lodgepole pine), *Pinus flexilis* (limber pine), *Pinus longaeva* (Great Basin bristlecone pine), *Populus tremuloides* (quaking aspen), and *Tsuga mertensiana* (mountain hemlock) (which is also important in Pacific maritime macrogroups). Varies from nearly closed-canopy forests to very open or patchy short-statured woodlands, clumps of tree islands or ribbons with intervening grasslands or shrublands near upper treeline.....**G2**
.....M020 Rocky Mountain Subalpine-High Montane Conifer Forest

M1b. Conifer and mixed deciduous-conifer macrogroup of lower montane forests, woodlands and savannas of the southern Rocky Mountains, Colorado Plateau, and Great Basin. Characteristic trees include *Abies concolor* (white fir), *Juniperus scopulorum* (Rocky Mountain juniper), *Pinus ponderosa* (ponderosa pine) (primarily *var. scopulorum* and *var. brachyptera*), *Pseudotsuga menziesii* (Douglas-fir), and the less extensive *Picea pungens* (blue spruce). *Populus tremuloides* (quaking aspen) may be present to codominant in the tree canopy. Other associated conifers in transitional stands include *Abies lasiocarpa var. arizonica* (corkbark fir), *Abies lasiocarpa var. lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce), *Pinus contorta* (lodgepole pine), and *Pinus flexilis* (limber pine), or at lower elevation *Pinus edulis* (two-needle pinyon). **G5**
.....M022 Southern Rocky Mountain Lower Montane Forest

M020 Rocky Mountain Subalpine-High Montane Conifer Forest

G2a. A group of upland forests dominated by *Populus tremuloides* (quaking aspen) without significant conifer cover and an understory structure of complex multiple shrub and herbaceous layers, or simply just an herbaceous layer. Widespread in the southern and central Rocky Mountains but occurs in the montane and subalpine zones throughout much of the western U.S., south into northern Mexico and north into Canada. **A8**
..... G222 Rocky Mountain Subalpine-Montane Aspen Forest & Woodland

G2b. Vegetation dominated by conifers. *Populus tremuloides* may be present to codominant, but rarely dominant. **G3**

G3a. Vegetation is a high-elevation forest dominated by *Picea engelmannii* (Engelmann spruce) and/or *Abies lasiocarpa* (subalpine fir).....**G4**

G3b. A group of open woodlands ranging from krummholz to over 10 m in height with *Pinus flexilis* (limber pine) and/or *Pinus longaeva* (Great Basin bristlecone pine) as the dominant conifer with an herbaceous layer that is typically sparse. On steep slopes and ridges between 2530 and 3600 m (8300-12,000 feet) elevation, in the Mojave Desert and eastern Sierra Nevada, central Great Basin to the high plateaus of southwestern and central Utah. **A13**
..... G224 Intermountain Basins Subalpine Limber Pine - Bristlecone Pine Woodland

G4a. Spruce-fir forest group of the drier sites within the subalpine zone of the east Cascades and Rocky Mountains with *Picea engelmannii* (Engelmann spruce) and *Abies lasiocarpa* (subalpine fir) dominating either mixed or alone; relatively dry to xeric understory. Diagnostic species may include *Amelanchier alnifolia* (Saskatoon serviceberry), *Juniperus communis* (common juniper), *Mahonia repens* (creeping barberry), *Physocarpus malvaceus* (mallow ninebark), *Shepherdia canadensis* (russet buffaloberry), *Vaccinium myrtillus* (whortleberry), or *Vaccinium scoparium* (grouse whortleberry).....**A10**
..... G219 Rocky Mountain Subalpine Dry-Mesic Spruce - Fir Forest & Woodland

G4b. High elevation spruce-fir forest group on mesic sites within the Rocky Mountains and eastern Cascades; dominated by *Picea engelmannii* (Engelmann spruce) and *Abies lasiocarpa* (subalpine fir). Typically in locations with cold-air drainage or ponding, or where snowpack lingers late into the summer. Moisture-loving understory species are diagnostic; shrubs *Cornus canadensis* (bunchberry dogwood), *Ledum glandulosum* (western Labrador-tea) (rare), *Menziesia ferruginea* (rusty menziesia), *Phyllodoce empetriformis* (pink mountainheath), *Rhododendron albiflorum* (Cascade azalea), *Rubus parviflorus* (thimbleberry), *Salix* (willow) spp. and *Vaccinium membranaceum* (thinleaf huckleberry). Mesic to wet herbaceous species include *Actaea rubra* (red baneberry), *Calamagrostis canadensis* (bluejoint), *Clintonia uniflora* (bride's bonnet),

Erigeron eximius (sprucefir fleabane), *Gymnocarpium dryopteris* (western oakfern), *Luzula glabrata var. hitchcockii* (Hitchcock's smooth woodrush), *Maianthemum stellatum* (starry false lily of the valley), *Rubus pedatus* (strawberryleaf raspberry), *Saxifraga bronchialis* (yellowdot saxifrage), *Thalictrum* (meadowrue) spp., *Tiarella* (foamflower) spp., and *Valeriana sitchensis* (Sitka valerian). This group is rare in the Central Basin and Range ecoregion so no alliances from this group are included in key.....
..... G218 Rocky Mountain Subalpine Moist Spruce - Fir Forest & Woodland*

M022 Southern Rocky Mountain Lower Montane Forest

G5a. Montane mixed conifer woodlands and forests dominated by *Pseudotsuga menziesii* (Douglas-fir) and *Abies concolor* (white fir), although as many as seven conifers and *Populus tremuloides* (quaking aspen) may be present.....**G6**

G5b. *Pinus ponderosa* (ponderosa pine) woodlands, sometimes codominated by *Juniperus* spp. (juniper) and *Populus tremuloides* (quaking aspen). **G7**

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G6a. Dry mixed-conifer forests of mainly *Pseudotsuga menziesii* (Douglas-fir) and *Abies concolor* (white fir), although as many as seven conifers can be found in mixed stands; many cold-deciduous shrub, forb and graminoid species common. Throughout the southern Rocky Mountains and Great Basin, east into Texas; mixed-severity fire regime.....**A14**
..... G226 Southern Rocky Mountain White Fir - Douglas-fir Dry Forest

G6b. A group of mesic or cold-site conifer, mixed conifer, or deciduous montane forests of the Rocky Mountains west into the ranges of the Great Basin. *Pseudotsuga menziesii* (Douglas-fir) and *Abies concolor* (white fir) are typical canopy dominants, sometimes with *Picea engelmannii* (Engelmann spruce), *Picea pungens* (blue spruce), *Pinus ponderosa* (ponderosa pine); also includes forests of conifer mixed with *Populus tremuloides* (quaking aspen) or *Acer grandidentatum* (bigtooth maple). The relatively mesic understory is diagnostic; naturally occurring fires are mostly light, erratic, and infrequent. This Group is rare in the Central Basin and Range ecoregion so no alliances from this group are included in key. .....
..... G225 Rocky Mountain Douglas-fir - White Fir - Blue Spruce Mesic Forest*

G7a. This group includes savanna-like woodlands with widely spaced (<25% tree canopy cover) *Pinus ponderosa* (ponderosa pine) (primarily *var. scopulorum* and *var. brachyptera*) (>150 years old). Understory is predominantly fire-resistant grasses and forbs that resprout following surface fires. Lower treeline/ecotone between grassland or shrubland and more mesic coniferous forests, typically in warm, dry, exposed sites. Colorado Plateau region, west into scattered locations in the Great Basin, and north along the eastern front of the southern Rocky Mountains into southeastern Wyoming. **A16**
..... G229 Southern Rocky Mountain Ponderosa Pine Open Woodland

G7b. Widespread woodland group found throughout the cordillera of the southern Rocky Mountains at lower treeline typically in warm, dry, exposed sites where the dominant tree is *Pinus ponderosa* (ponderosa pine) (primarily *var. scopulorum* and *var. brachyptera*) usually with a shrubby layer of species of *Artemisia* (sagebrush), *Arctostaphylos* (manzanita), *Cercocarpus* (mountain mahogany), *Purshia* (bitterbrush), *Symphoricarpos* (snowberry), and *Quercus gambelii* (Gambel oak), with grasses *Pseudoroegneria spicata* (bluebunch wheatgrass), *Pascopyrum smithii* (western wheatgrass), and species of *Achnatherum* (needlegrass), *Bouteloua* (grama), *Festuca* (fescue), *Hesperostipa* (needle-and-thread), and *Muhlenbergia* (muhly).....**A17**
..... G228 Southern Rocky Mountain Ponderosa Pine Forest & Woodland

G222 Rocky Mountain Subalpine-Montane Aspen Forest & Woodland

A8a. Vegetation is dominated by *Populus tremuloides* (quaking aspen). **A9**

A8b. Alliance of mainly deciduous forests dominated by *Acer grandidentatum* (bigtooth maple) in relatively moist lower montane areas of the Utah-Wyoming Rocky Mountains and Colorado Plateau.**..... A3371 Acer grandidentatum Montane Forest Alliance**

A9a. Aspen forest alliance widespread in the southern, central and northern Rocky Mountains, west to the Sierra Nevada and east to the Black Hills; defined by a canopy dominated by *Populus tremuloides* (quaking aspen).....
..... A2036 Populus tremuloides Rocky Mountain Forest & Woodland Alliance

A9b. This alliance is known only from Grand Canyon National Park and El Malpais National Monument and characterized by open woodland or regenerating stands of *Populus tremuloides* (quaking aspen). .....
..... A4078 Populus tremuloides Southern Rocky Mountain Woodland & Scrub Alliance

G219 Rocky Mountain Subalpine Dry-Mesic Spruce - Fir Forest & Woodland

A10a. Forest and woodland alliance of the northern, central and southern Rocky Mountains occurs on talus and scree slopes; dominated by *Abies lasiocarpa* (subalpine fir) or *Picea engelmannii* (Engelmann spruce). .....
..... A3644 Abies lasiocarpa - Picea engelmannii Dry-Mesic Scree & Talus Woodland Alliance

A10b. Site is not scree or talus; characterized by *Abies lasiocarpa* (subalpine fir) or *Picea engelmannii* (Engelmann spruce). **A11**

A11a. Forest alliance of the southern and central Rocky Mountains and Intermountain West with mixed canopies codominated by *Abies lasiocarpa* (subalpine fir) and *Populus tremuloides* (quaking aspen). .....
... A3645 Abies lasiocarpa - Populus tremuloides Rocky Mountain Dry-Mesic Forest Alliance

A11b. Vegetation is not codominated by *Abies lasiocarpa* (subalpine fir) and *Populus tremuloides* (quaking aspen). **A12**

A12a. This alliance from the Colorado Plateau, Arizona - New Mexico Mountains and southern Rocky Mountains consists of forests dominated by *Abies lasiocarpa* (subalpine fir) and/or *Picea engelmannii* (Engelmann spruce). Associated trees species may include, *Pinus aristata* (bristlecone pine), *Pinus contorta* (lodgepole pine), *Pinus flexilis* (limber pine), and *Pseudotsuga menziesii* (Douglas-fir). Characteristic understory species include shrubs *Jamesia americana* (fivepetal cliffbush), *Lonicera utahensis* (Utah honeysuckle), and herbaceous species *Bromus ciliatus var. richardsonii* (fringed brome), *Carex siccata* (dryspike sedge), *Poa fendleriana* (muttongrass), *Lathyrus lanszwertii var. leucanthus* (Nevada pea), and *Packera sanguisorboides* (burnet ragwort). .....
..... A3641 Abies lasiocarpa - Picea engelmannii Southern Rocky Mountain Dry-Mesic Forest Alliance

A12b. This alliance is characterized by forests and woodlands throughout the central and northern Rocky Mountains and eastern Cascades and extends south into Southern Rockies with wide ranging associations. Stands are dominated by *Abies lasiocarpa* (subalpine fir) and/or *Picea engelmannii* (Engelmann spruce). Associated trees species may include *Larix occidentalis* (western larch), *Pinus contorta* (lodgepole pine), and *Pseudotsuga menziesii* (Douglas-fir), and *Pinus flexilis* (limber pine), or *Pinus albicaulis* (whitebark pine) in NW Wyoming and northern Utah. Characteristic understory species include shrubs *Juniperus communis* (common juniper), *Mahonia repens* (creeping barberry), *Paxistima myrsinites* (Oregon boxleaf), *Physocarpus monogynus* (mountain ninebark), *Vaccinium myrtillus* (whortleberry), *Vaccinium scoparium* (grouse whortleberry), and herbaceous species *Arnica cordifolia* (heartleaf arnica), *Arnica latifolia* (broadleaf arnica), *Calamagrostis rubescens* (pinegrass) *Carex geyeri* (Geyer's sedge), *Carex rossii* (Ross' sedge), *Clematis columbiana* (rock clematis), *Hypnum revolutum* (revolute hypnum moss), *Osmorhiza berteroi* (sweetcicely), and *Pedicularis racemosa* (sickletop lousewort). .....
..... A3643 Abies lasiocarpa - Picea engelmannii Rocky Mountain Dry-Mesic Forest Alliance

G224 Intermountain Basins Subalpine Limber Pine - Bristlecone Pine Woodland

A13a. Widely scattered subalpine forest and woodland alliance dominated by *Pinus longaeva* (Great Basin bristlecone pine), although some stands may be codominated by *Abies concolor var. concolor* (white fir) and *Pinus ponderosa* (ponderosa pine). Mountain slopes throughout the Great Basin into western Utah. .....
..... A0518 Pinus longaeva Forest & Woodland Alliance

A13b. Forests and woodlands dominated or codominated by the evergreen needle-leaved tree *Pinus flexilis* (limber pine); central Great Basin, Columbia Plateau, middle and southern Rocky Mountains and Wyoming Basins. .....
..... A2035 Pinus flexilis Intermountain Basins Forest & Woodland Alliance

G226 Southern Rocky Mountain White Fir - Douglas-fir Dry Forest

A14a. Forest and woodland alliance dominated by *Picea pungens* (blue spruce); southern Rocky Mountains west to the Great Basin. .....
..... A3453 Picea pungens Southern Rocky Mountain Forest & Woodland Alliance

A14b. Vegetation not dominated by *Picea pungens* (blue spruce). **A15**

A15a. Forests and woodlands of the southern and central Rocky Mountains dominated or codominated by diagnostic late seral tree species *Abies concolor* (white fir) often with early to mid-seral *Pseudotsuga menziesii* (Douglas-fir) or *Populus tremuloides* (quaking aspen) present to codominant. ..... **A3420 Abies concolor Dry Forest & Woodland Alliance**

A15b. Forests and woodlands primarily of the southern and central Rocky Mountains dominated by diagnostic late seral tree species *Pseudotsuga menziesii* (Douglas-fir) with *Abies concolor* (white fir) typically absent or with low cover. *Populus tremuloides* (quaking aspen) is often present to codominant. .....
..... A3454 Pseudotsuga menziesii Southern Rocky Mountain Forest & Woodland Alliance

G229 Southern Rocky Mountain Ponderosa Pine Open Woodland

A16a. These savannas or open woodlands are characterized by widely spaced canopies dominated by *Pinus ponderosa* (ponderosa pine) primarily occurring in the southern Rocky Mountains and extending into adjacent ecoregions. .....
.....A3419 Pinus ponderosa / Grass Understory Southern Rocky Mountain Open Woodland Alliance

A16b. Currently only one alliance in this Group .....

G228 Southern Rocky Mountain Ponderosa Pine Forest & Woodland

A17a. Variable alliance of forest and woodlands dominated by *Pinus ponderosa* (ponderosa pine) in association with other conifer species; southern Rocky Mountains with scattered occurrences in adjacent ecoregions. .....
.....A3398 Pinus ponderosa Southern Rocky Mountain Forest & Woodland Alliance

A17b. Currently only one alliance in this Group .....

D010 Western North American Pinyon - Juniper Woodland & Scrub

M1a. Variable pinyon and juniper woodland and savanna macrogroup characterized by *Pinus monophylla* (singleleaf pinyon), *Juniperus occidentalis* (western juniper), *Juniperus osteosperma* (Utah juniper), *Juniperus californica* (California juniper) and/or *Cercocarpus ledifolius* (curl-leaf mountain-mahogany). In the Great Basin north and east into the Columbia Plateau, Wyoming and Montana, east into the Colorado Plateau, and desert ranges in the Mojave Desert and eastern foothills of the Sierra Nevada. **G2**
..... M026 Intermountain Singleleaf Pinyon - Juniper Woodland

M1b. Pinyon and juniper savanna and woodland macrogroup characterized by *Pinus edulis* (two-needle pinyon) and/or *Juniperus monosperma* (one-seed juniper) or *Juniperus osteosperma* (Utah juniper), with an understory dominated by shrubs or grasses; Madrean indicator species lacking. Centered in the Colorado Plateau and east across southern Colorado, northern New Mexico, and on breaks in the southwestern Great Plains. **G5**
..... M027 Southern Rocky Mountain-Colorado Plateau Two-needle Pinyon - Juniper Woodland

M026 Intermountain Singleleaf Pinyon - Juniper Woodland

G2a. Woodland and savanna group centered on the Columbia Plateau, eastern foothills of the Cascades and the Modoc Plateau across the northern margin of the Great Basin. Characterized by tree canopy of *Juniperus occidentalis* (western juniper) that is sometimes codominated by *Cercocarpus ledifolius* (curl-leaf mountain-mahogany), typically a shrubby understory dominated by *Artemisia tridentata* (big sagebrush). This Group does not occur in the Central Basin and Range ecoregion. No alliances from this group are included in key. .....
..... G248 Columbia Plateau Western Juniper Open Woodland*

G2b. Vegetation not dominated or codominated by *Juniperus occidentalis* (western juniper). If *Juniperus occidentalis* is present then it occurs with *Pinus monophylla* (singleleaf pinyon) and/or *Juniperus osteosperma* (Utah juniper) in transition zone in northern edge of Central Basin and Range. **G3**

G3a. *Cercocarpus ledifolius* (curl-leaf mountain-mahogany)-dominated woodland and shrubland group; hills and mountain ranges of the Great Basin from the eastern foothills of the Sierra Nevada northeast to the foothills of the Bighorn Mountains. Includes both tree and shrub forms of *Cercocarpus ledifolius* (curl-leaf mountain-mahogany) with *Artemisia tridentata ssp. vaseyana* (mountain big sagebrush), *Purshia tridentata* (antelope bitterbrush), and species of *Arctostaphylos* (manzanita), *Ribes* (currant), or *Symphoricarpos* (snowberry) often present to codominant in the shrub layer. **A6**
..... G249 Intermountain Basins Curl-leaf Mountain-mahogany Woodland & Scrub

G3b. *Cercocarpus ledifolius*-(curl-leaf mountain-mahogany) may be present to codominant, but does not dominate the woodland or shrubland. **G4**

G4a. Woodland group characterized by tree canopy of a mix of *Pinus monophylla* (singleleaf pinyon) and *Juniperus osteosperma* (Utah juniper), but either tree species may dominate. There is significant (not accidental) presence of *Pinus monophylla* (singleleaf pinyon). Dry mountain

ranges of the Great Basin, eastern foothills of the Sierra Nevada, and scattered locations in southeastern California, including desert mountain ranges. **A8**
..... G247 Great Basin Pinyon - Juniper Woodland

G4b. Widespread *Juniperus osteosperma* (Utah juniper) woodland and savanna group. Savanna characterized by open tree canopy of *Juniperus osteosperma* (Utah juniper) trees with high cover of perennial bunchgrasses and forbs; often with inclusions of denser patches of juniper. Woodlands often with a shrub understory. Lacking pinyon trees (*Pinus edulis* (two-needle pinyon) and *Pinus monophylla* (singleleaf pinyon)); if pinyon trees are present, they are accidental (infrequent or limited to special microsites). Dry foothills and sandsheets of the Colorado Plateau and eastern Great Basin (western Colorado to Nevada and southern Idaho, northwestern New Mexico and northern Arizona). **G5**
..... G246 Colorado Plateau-Great Basin Juniper Open Woodland

M027 Southern Rocky Mountain-Colorado Plateau Two-needle Pinyon - Juniper Woodland

G5a. Woodland group composed of *Pinus edulis* (two-needle pinyon) often with *Juniperus osteosperma* (Utah juniper) or *Juniperus scopulorum* (Rocky Mountain juniper) (at higher elevations) codominant in the tree canopy; understories variable. Dry mountains and foothills of the Colorado Plateau region, Western Slope of Colorado and the Wasatch Range, south to the Mogollon Rim, and east into northwestern New Mexico.....**A9**
..... G250 Colorado Plateau Pinyon - Juniper Woodland

G5b. Other groups in this macrogroup do not occur in the key area. .....

G249 Intermountain Basins Curl-leaf Mountain-mahogany Woodland & Scrub

A6a. Shrubland alliance with an open to moderately dense shrub layer dominated or codominated by the shrub form *Cercocarpus ledifolius* (curl-leaf mountain-mahogany) with a sparse to moderately dense herbaceous layer. .....
..... A0828 Cercocarpus ledifolius Scrub Alliance

A6b. Vegetation with open to dense tree form of *Cercocarpus ledifolius* (curl-leaf mountain-mahogany). **A7**

A7a. Woodland alliance with open to moderately dense tree canopy of *Cercocarpus ledifolius* (curl-leaf mountain-mahogany) with the understory characterized by a shrub layer (>10% cover) or, if less, then shrub cover exceeds herbaceous cover. Most common on the east slope of the Sierra Nevada and the Great Basin, but occurs elsewhere in the interior western U.S. .....
..... A0586 Cercocarpus ledifolius / Shrub Understory Woodland Alliance

A7b. Woodland alliance of *Cercocarpus ledifolius* (curl-leaf mountain-mahogany) with an understory of an open to moderate herbaceous layer typically dominated by bunchgrasses. Most common on the east slope of the Sierra Nevada and the Great Basin, but occurs elsewhere in the interior western U.S. .....
..... A3570 Cercocarpus ledifolius / Herbaceous Understory Woodland Alliance

G247 Great Basin Pinyon - Juniper Woodland

A8a. Woodland alliance of *Pinus monophylla* (singleleaf pinyon) that forms an open to dense tree layer often with *Juniperus osteosperma* (Utah juniper) or, less frequently, *Juniperus californica* (California juniper) in southern California. Understory shrubby, from open to moderately dense. .....
.. A2108 Pinus monophylla - Juniperus osteosperma / Shrub Understory Woodland Alliance

A8b. Open woodland and savanna alliance is characterized by *Pinus monophylla* (singleleaf pinyon), often with *Juniperus osteosperma* (Utah juniper) or, less frequently, *Juniperus californica* (California juniper) in southern California. Understory lacks significant cover of shrubs; typically with a open to dense layer of perennial grasses. .....
..... A2109 Pinus monophylla - Juniperus osteosperma / Herbaceous Understory Open Woodland Alliance

G246 Colorado Plateau-Great Basin Juniper Open Woodland

A9a. Juniper woodland alliance with an open to moderately dense, short (<15 m) tree canopy; strongly dominated by *Juniperus osteosperma* (Utah juniper) or *Juniperus scopulorum* (Rocky Mountain juniper) (at higher elevations). A shrubby understory (generally >10% cover). If understory is sparse then shrubs exceed herbaceous cover. Colorado Plateau, west into the Great Basin and north and east into the foothills of the central and southern Rocky Mountains.**..... A3496 Juniperus osteosperma / Shrub Understory Woodland Alliance**

A9b. Juniper woodland and savanna alliance with an open to moderately dense, short (<15 m) tree canopy strongly dominated by *Juniperus osteosperma* (Utah juniper) or *Juniperus scopulorum* (Rocky Mountain juniper) (at higher elevations). Understory dominated by an open to dense layer of perennial grasses and lacking significant cover of shrubs. Colorado Plateau, west into the Great Basin, and north and east into the foothills of the central and southern Rocky Mountains. .....
..... A3497 Juniperus osteosperma / Herbaceous Understory Open Woodland Alliance

G250 Colorado Plateau Pinyon - Juniper Woodland

A10a. Pinyon-juniper woodland and savanna alliance is characterized by *Pinus edulis* (two-needle pinyon) as a very open to moderately dense tree layer often with *Juniperus osteosperma* (Utah juniper). Understory dominated by an open to dense layer of perennial grasses, lacking significant cover of shrubs. If shrubs are present then generally <10% cover and herbaceous layer exceeds cover of shrubs. Dry mountain slopes, foothills, plateaus in the Colorado Plateau extending east into the west slope of the southern Rocky Mountains. .....
..... A3572 Pinus edulis - Juniperus osteosperma / Herbaceous Understory Open Woodland Alliance

A10b. Open woodland with understory dominated by shrubs. If an herbaceous layer is present then shrubs have significant cover (usually >10%) or, if less, then exceeding cover of grasses. **A11**

A11a. Pinyon-juniper woodland alliance characterized by *Pinus edulis* (two-needle pinyon) with a very open to moderately dense tree layer often with *Juniperus osteosperma* (Utah juniper), sometimes *Juniperus monosperma* (one-seed juniper) or *Juniperus scopulorum* (Rocky Mountain juniper). Relatively mesic, open to dense shrubby understory or shrubs exceed cover of grasses. Diagnostic shrubs include *Amelanchier utahensis* (Utah serviceberry), *Arctostaphylos patula* (greenleaf manzanita), *Arctostaphylos pungens* (pointleaf manzanita), *Artemisia tridentata ssp. tridentata* (basin big sagebrush), *Artemisia tridentata ssp. vaseyana* (mountain big sagebrush), *Artemisia tridentata ssp. wyomingensis* (Wyoming big sagebrush), *Cercocarpus ledifolius* (curl-leaf mountain-mahogany), *Quercus gambelii* (Gambel oak), and *Symphoricarpos oreophilus* (mountain snowberry). Dry-mesic mountain slopes, foothills, and plateaus in the Colorado Plateau extending east into the west slope of the southern Rocky Mountains. .....
A3571 Pinus edulis - Juniperus osteosperma / Shrub Understory Foothill & Lower Montane Dry-Mesic Woodland Alliance

A11b. Scrub pinyon-juniper woodland alliance of exposed rocky mesatops and canyon slopes and rims in the Colorado Plateau. Diagnostic tree species *Pinus edulis* (two-needle pinyon) forms a very open to moderately dense, short tree layer often with *Juniperus osteosperma* (Utah juniper) and an understory lacking or dominated by an open to moderately dense layer of shrubs (>10% cover) or, if less, then exceeding cover of grasses.....
..... A3573 Pinus edulis - Juniperus osteosperma / Shrub Understory Colorado Plateau Woodland & Scrub Alliance

2.B.1 Mediterranean Scrub & Grassland

D327 Californian Scrub & Grassland

M1a. This ruderal macrogroup encompasses the non-native-dominated annual or perennial grasslands, forblands and scrub found in the Californian chaparral region ("Mediterranean" California). Characteristic introduced graminoid species include *Aegilops triuncialis* (barbed goatgrass), *Avena barbata* (slender oat), *Avena fatua* (wild oat), *Brachypodium distachyon* (purple false brome), *Briza maxima* (big quakinggrass), *Bromus diandrus* (ripgut brome), *Bromus hordeaceus* (soft brome), *Bromus rubens* (red brome), *Cynosurus echinatus* (bristly dogstail grass), *Hordeum murinum* (mouse barley), *Lolium perenne ssp. multiflorum* (Italian ryegrass), *Taeniatherum caput-medusae* (medusahead), *Vulpia bromoides* (brome fescue), and *Vulpia myuros* (annual fescue). Introduced forb species include *Brassica nigra* (black mustard), *Carduus pycnocephalus* (Italian plumeless thistle), *Centaurea* (knapweed) spp., *Conium maculatum* (poison hemlock), *Erodium botrys* (longbeak stork's bill), *Erodium cicutarium* (redstem stork's bill), *Foeniculum vulgare* (sweet fennel), *Geranium dissectum* (cutleaf geranium), *Hypochaeris glabra* (smooth cat's ear), and *Medicago polymorpha* (burclover). Non-native ruderal scrub species include *Acacia cyclops*, *Ulex europaeus* (common gorse), *Cytisus scoparius* (Scotch broom), and species of *Genista* (broom) and *Spartium*, among others. If the shrub layer is mostly native dominated, then the herbaceous layer (must be >10% cover) and strongly dominated by non-native species so that the natural understory cannot be determined (usually >90% relative cover non-native). If herbaceous cover then < 10% then treat as sparse understory natural type. **G2**
..... M046 Californian Ruderal Grassland, Meadow & Scrub

M1b. Vegetation is not as above. Vegetation is dominated by California chaparral, coastal scrub, or native grasslands that are restricted to the western side of the Sierra Nevada. .....
..... M043 Californian Chaparral*;
..... M044 Californian Coastal Scrub*
..... M045 Californian Annual & Perennial Grassland*

M046 Californian Ruderal Grassland, Meadow & Scrub

G2a. This warm-temperate Californian ruderal grassland, forbland and scrub group is most commonly dominated by non-native annual or perennial herbaceous species which usually compose >90% of the total cover. Characteristic species include such as grasses *Avena barbata* (slender oat), *Avena fatua* (wild oat), *Bromus diandrus* (ripgut brome), *Bromus hordeaceus* (soft brome), *Bromus madritensis* (compact brome), *Cortaderia jubata* (purple pampas grass), *Cortaderia selloana* (Uruguayan pampas grass), *Lolium perenne ssp. multiflorum* (Italian ryegrass), *Hordeum murinum* (mouse barley), *Taeniatherum caput-medusae* (medusahead), *Vulpia bromoides* (brome fescue), *Vulpia myuros* (annual fescue), and forbs *Carduus pycnocephalus* (Italian plumeless thistle), *Centaurea* (knapweed) spp., *Erodium botrys* (longbeak stork's bill), *Erodium cicutarium* (redstem stork's bill), *Medicago polymorpha* (burclover), *Geranium dissectum* (cutleaf geranium), *Hypochaeris glabra* (smooth cat's ear), and *Raphanus sativus* (cultivated radish). If the shrub layer is mostly native dominated, then the herbaceous layer (must be >10% cover) and strongly dominated by non-native species so that the natural understory cannot be determined (usually >90% relative cover non-native). If herbaceous cover then < 10% then treat as sparse understory natural type. **A3**
..... G497 Californian Ruderal Grassland, Meadow & Scrub

G2b. Only one group in this macrogroup **A3**

G497 Californian Ruderal Grassland, Meadow & Scrub

A3a. Vegetation is dominated by perennial non-native species **A4**
A3b. Vegetation is dominated by annual non-native species.....**A6**

A4a. This alliance consists of stands dominated by *Cortaderia jubata* (purple pampas grass) and/or *Cortaderia selloana* (Uruguayan pampas grass). It occurs primarily in coastal California in disturbed areas, estuaries, inland grasslands, urban areas, and wetlands. .....
..... A1203 Cortaderia jubata - Cortaderia selloana Ruderal Grassland Alliance*

A4b. Vegetation is not as above. *Cortaderia jubata* (purple pampas grass) and/or *Cortaderia selloana* (Uruguayan pampas grass) are absent or have low cover. **A5**

A5a. This alliance consists of meadows where *Lolium perenne* (perennial ryegrass) is dominant or codominant with other non-natives in the herbaceous layer. It occurs throughout California. Generally, this type occurs in seasonally moist to wet environments that are regularly disturbed through grazing, fire, flooding, or mechanical means. .....
.....A3871 Lolium perenne Ruderal Grassland Alliance

A5b. This alliance consists of meadows dominated by non-native perennial forbs such as *Centaurea biebersteinii* (spotted knapweed), *Centaurea calcitrapa* (red star-thistle), *Centaurea diffusa* (diffuse knapweed), *Centaurea triumfettii* (squarrose knapweed), *Conium maculatum* (poison hemlock), *Daucus carota* (Queen Anne's lace), and/or *Foeniculum vulgare* (sweet fennel). This alliance is found in California and probably north into Oregon.....
... A3872 Centaurea triumfettii - Conium maculatum - Foeniculum vulgare Ruderal Meadow Alliance

A6a. This is a non-native-dominated alliance of annual grasslands and forblands of California and Baja California. The composition varies widely. Many alien annual species may be present, including *Aegilops triuncialis* (barbed goatgrass), *Aira caryophyllea* (silver hairgrass), *Avena barbata* (slender oat), *Avena fatua* (wild oat), *Brachypodium distachyon* (purple false brome), *Brassica* (mustard) spp., *Bromus diandrus* (ripgut brome), *Bromus hordeaceus* (soft brome), *Bromus madritensis* (compact brome), *Centaurea melitensis* (Maltese star-thistle), *Centaurea solstitialis* (yellow star-thistle), and *Cynosurus echinatus* (bristly dogstail grass).....
.....A3870 Avena fatua - Bromus spp. Ruderal Annual Grassland Alliance

A6b. This alliance consists of meadows dominated by non-native forbs such as *Brassica nigra* (black mustard) and other mustards, *Raphanus* (radish) spp., *Hirschfeldia incana* (shortpod mustard) and *Isatic tinctoria* (Dyer's Woad). This alliance occurs widely in California and it likely occurs north into Oregon. .....
.....A4214 Brassica nigra - Raphanus spp. Ruderal Annual Forb Meadow Alliance

2.B.2 Temperate Grassland & Shrubland

D022 - Western North American Grassland & Shrubland

M1a. Upland macrogroup of ruderal annual and perennial grasslands, meadows steppe and shrublands found on human-disturbed sites, and dominated by non-native (usually >90% relative cover) and generalist native species in temperate areas of U.S. (Rockies westward) and southwestern Canada. If shrub layer is mostly native, then a significant herbaceous layer (>10% cover) is present and strongly dominated by non-native species so that the natural understory cannot be determined (usually >90% relative cover non-native). If herbaceous cover < 10% then treat as sparse understory a natural type. **G3**

..... M493 Western North American Ruderal Grassland & Shrubland

M1b. Vegetation is not as above. Ruderal species may be present but vegetation is characterized by native shrubs, grasses, or forbs. **M2**

M2a. Montane shrubland macrogroup of the southern Rocky Mountains, Colorado Plateau and outcrops and canyon slopes in the western and southern Great Plains. Characterized by an open to dense shrub layer typically dominated by *Cercocarpus montanus* (alderleaf mountain-mahogany), *Purshia tridentata* (antelope bitterbrush), and/or *Quercus gambelii* (Gambel oak), and several other characteristic shrubs. **G4**

.....M049 Southern Rocky Mountain Montane Shrubland

M2b. Montane and subalpine herbaceous macrogroup includes mesic meadows and drier grasslands in the western U.S. The low (<1 m) perennial graminoid layer has characteristic species *Danthonia intermedia* (timber oatgrass), *Danthonia parryi* (Parry's oatgrass), *Festuca arizonica* (Arizona fescue), *Festuca thurberi* (Thurber's fescue), and *Muhlenbergia montana* (mountain muhly) in montane and subalpine grasslands in the southern Rocky Mountains. Dominant mesic meadow species include *Achillea millefolium* (common yarrow), *Calamagrostis breweri* (shorthair reedgrass), *Carex spectabilis* (showy sedge), *Carex straminiformis* (Shasta sedge), *Chamerion angustifolium* (fireweed), *Elymus trachycaulus* (slender wheatgrass), *Erigeron speciosus* (aspen fleabane), *Festuca viridula* (greenleaf fescue), *Lupinus latifolius* (broadleaf lupine), *Phleum alpinum* (alpine timothy), *Senecio hydrophiloides* (tall groundsel), *Senecio serra* (tall ragwort), *Solidago canadensis* (Canada goldenrod), *Symphyotrichum* (aster) spp., *Thalictrum occidentale* (western meadowrue), and *Zigadenus elegans* (mountain deathcamas). **G5**

.....M168 Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

M493 Western North American Ruderal Grassland & Shrubland

G3a. Temperate ruderal grassland, shrubland and steppe group strongly dominated by non-native species. Characteristic species include: *Agropyron cristatum* (crested wheatgrass), *Alopecurus pratensis* (meadow foxtail), *Arrhenatherum elatius* (tall oatgrass), *Bassia scoparia* (burningbush), *Bromus inermis* (smooth brome), *Dactylis glomerata* (orchardgrass), *Descurainia sophia* (herb sophia), *Elymus repens* (quackgrass), *Lepidium latifolium* (broadleaved pepperweed) *Lepidium perfoliatum* (clasping pepperweed), *Phleum pratense* (timothy), *Poa bulbosa* (bulbous bluegrass), *Poa compressa* (Canada bluegrass), *Poa pratensis* (Kentucky bluegrass), *Psathyrostachys juncea* (Russian wildrye), *Rumex crispus* (curly dock), and *Thinopyrum intermedium* (intermediate wheatgrass). Includes natural and degraded shrublands and steppe with herbaceous understory strongly dominated by non-native species. Common in disturbed valley bottoms, alluvial flats, fans and lower valley in the western US.....**A6**

..... G624 Western North American Interior Ruderal Grassland & Shrubland Group

G3b. Currently only one Group in this Macrogroup .....

M049 Southern Rocky Mountain Montane Shrubland

G4a. This relatively mesic shrubland group occurs in the mountains, plateaus and foothills of the southern Rocky Mountains and Colorado Plateau, and is typically dominated by *Quercus gambelii* (Gambel oak) alone or codominant with *Amelanchier alnifolia* (Saskatoon serviceberry), *Amelanchier utahensis* (Utah serviceberry), *Artemisia tridentata* (big sagebrush), *Cercocarpus montanus* (alderleaf mountain-mahogany), *Fraxinus anomala* (singleleaf ash), *Prunus virginiana* (chokecherry), *Purshia stansburiana* (Stansbury cliffrose), *Purshia tridentata* (antelope bitterbrush), *Robinia neomexicana* (New Mexico locust), *Symphoricarpos oreophilus* (mountain snowberry), or *Symphoricarpos rotundifolius* (roundleaf snowberry). Also included are upland stands lacking *Quercus gambelii* (Gambel oak) that are dominated by *Amelanchier alnifolia* (Saskatoon serviceberry), *Amelanchier utahensis* (Utah serviceberry), *Ceanothus fendleri* (Fendler's ceanothus), *Cercocarpus montanus* (alderleaf mountain-mahogany), *Fraxinus anomala* (singleleaf ash), *Prunus virginiana* (chokecherry), *Purshia stansburiana* (Stansbury

cliffrose), *Purshia tridentata* (antelope bitterbrush), and/or *Robinia neomexicana* (New Mexico locust). **A8**

.....G277 Southern Rocky Mountain Gambel Oak - Mixed Montane Shrubland

G4b. This relatively dry foothills shrubland group occurs in the Rocky Mountains and Colorado Plateau from lower montane zone to canyons and breaks in the western Great Plains and is characterized by an open to closed shrub layer of nearly pure *Cercocarpus montanus* (alderleaf mountain-mahogany) or a mixed shrub layer with *Amelanchier utahensis* (Utah serviceberry), *Quercus x pauciloba*, *Purshia tridentata* (antelope bitterbrush), *Rhus trilobata* (skunkbush sumac), *Ribes cereum* (wax currant), or *Symphoricarpos oreophilus* (mountain snowberry).....**A10**

..... G276 Southern Rocky Mountain Mountain-mahogany - Mixed Foothill Shrubland

M168 Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

G5a. This Rocky Mountain, northern Vancouverian and Sierran group is typically lush meadow dominated by a diversity of taller forbs, including *Achillea millefolium* (common yarrow), *Agastache urticifolia* (nettleleaf giant hyssop), *Balsamorhiza sagittata* (arrowleaf balsamroot), *Geranium viscosissimum* (sticky purple geranium), *Ligusticum* (licorice-root) spp., *Rudbeckia occidentalis* (western coneflower), *Thalictrum occidentale* (western meadowrue), *Valeriana sitchensis* (Sitka valerian), and *Xerophyllum tenax* (common beargrass), typically with grasses intermingled in many of them. However, it includes stands dominated by grasses with relatively broad and soft blades and a few mesic sedges such as *Calamagrostis breweri* (shorthair reedgrass), *Carex filifolia* (threadleaf sedge), *Carex straminiformis* (Shasta sedge), *Elymus trachycaulus* (slender wheatgrass), *Festuca viridula* (greenleaf fescue), and *Phleum alpinum* (alpine timothy). **A14**

.....G271 Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow

G5b. This southern Rocky Mountains grassland group typically occurs between 2200 and 3000 m elevation on flat to rolling plains and parks or on lower sideslopes that are dry, and is characterized by an open to dense perennial graminoid layer dominated by *Blepharoneuron tricholepis* (pine dropseed), *Danthonia intermedia* (timber oatgrass), *Danthonia parryi* (Parry's oatgrass), *Festuca arizonica* (Arizona fescue), *Festuca idahoensis* (Idaho fescue), *Festuca thurberi* (Thurber fescue), *Muhlenbergia filiculmis* (slimstem muhly), *Muhlenbergia montana* (mountain muhly), *Pascopyrum smithii* (western wheatgrass), *Poa lettermanii* (Letterman's bluegrass), *Poa nervosa* (Wheeler bluegrass), or *Pseudoroegneria spicata* (bluebunch wheatgrass). **A17**

.....G268 Southern Rocky Mountain Montane-Subalpine Grassland

G624 Western North American Interior Ruderal Grassland & Shrubland

A6a. This ruderal alliance occurs in disturbed dry to mesic meadows found in lowland, montane and subalpine elevations (sea level to 3600 m) throughout the western U.S. and Canada. Vegetation is characterized by dominance of non-native forbs such as *Rumex crispus* (curly dock). .....

.....A4191 Rumex crispus - (other FAC & Dryland Forb Species) Ruderal Meadow Alliance

A6b. This vegetation is dominated by non-native grasses rather than non-native forbs **A7**

A7a. This ruderal alliance is dominated by the non-native grass *Elymus repens* (quackgrass) and is known from disturbed valley bottoms, alluvial flats, fans and lower valley wall sites in western Colorado and northwestern Montana and likely occurs elsewhere in the western US..*.....***A2658 Elymus repens Ruderal Grassland Alliance**

A7b. This ruderal alliance occurs in disturbed, dry to mesic grasslands and meadows found at lowland, montane and subalpine elevations (sea level to 3600 m) throughout the western U.S. and Canada. Vegetation can be a monoculture of a single non-native graminoid species, or a mix of several non-native forbs and graminoids. Graminoids include *Agropyron cristatum* (crested wheatgrass) and *Bromus inermis* (smooth brome) (which has been purposefully seeded to prevent soil erosion), as well as many introduced forage species, especially in more mesic montane uplands such as *Alopecurus pratensis* (meadow foxtail), *Dactylis glomerata* (orchardgrass), *Phleum pratense* (timothy), *Poa pratensis* (Kentucky bluegrass), and *Psathyrostachys juncea* (Russian wildrye). Highly invasive and wind- and animal-dispersed, non-native forb species include *Sisymbrium altissimum* (tall tumblemustard), *Descurainia sophia* (herb sophia), and *Lappula occidentalis* (flatspine stickseed). .....

....A3254 Agropyron cristatum - Bromus inermis - Poa pratensis Ruderal Grassland Alliance

G277 Southern Rocky Mountain Gambel Oak - Mixed Montane Shrubland

A8a. This mixed shrub alliance occupies talus, scree, rock outcrop and steep to moderate colluvial slope sites of the southern Rocky Mountains and plateaus of the Colorado Plateaus and extends into ranges in the Great Basin. Vegetation is often patchy and variable and is

dominated by *Brickellia californica* (California brickellbush), *Fraxinus anomala* (singleleaf ash), *Fendlera rupicola* (cliff fendlerbush), *Jamesia americana* (fivepetal cliffbush), *Prunus virginiana* (chokecherry), and/or *Rhus trilobata* (skunkbush sumac). ..... **..... A3736 Fraxinus anomala - Rhus trilobata - Fendlera rupicola Talus & Rock Outcrop Shrubland Alliance**

A8b. Shrublands dominated by other shrub species or if dominated by *Brickellia californica* (California brickellbush), *Fraxinus anomala* (singleleaf ash), *Fendlera rupicola* (cliff fendlerbush), *Jamesia americana* (fivepetal cliffbush), *Prunus virginiana* (chokecherry), and/or *Rhus trilobata* (skunkbush sumac), then vegetation does not occupy talus, scree, rock outcrop and steep to moderate colluvial slope sites. **A9**

A9a. This alliance is characterized by shrubland and shrub-steppe vegetation where the dominant shrub is *Ceanothus fendleri* (Fendler's ceanothus). It is described from Bandelier National Monument in north-central New Mexico and Grand Canyon National Park in northern Arizona and likely occurs elsewhere in the southern Rocky Mountains and Colorado Plateau. **..... A3737 Ceanothus fendleri Shrubland & Shrub-Steppe Alliance***

A9b. This alliance occurs in the southern Rocky Mountains and Colorado Plateau and extends into the southern Great Basin. It is characterized by dominance or codominance of *Quercus gambelii* (Gambel oak) in association with other mid-elevation shrubs and includes mesic upland stands of *Rhus trilobata* (skunkbush sumac)..... **..... A3735 Quercus gambelii - Symphoricarpos oreophilus Shrubland Alliance**

G276 Southern Rocky Mountain Mountain-mahogany - Mixed Foothill Shrubland

A10a. This alliance is characterized by short, open shrublands occupying lava flows of El Malpais National Monument dominated by *Fallugia paradoxa* (Apache plume), *Ribes cereum* (wax currant), or *Rhus trilobata* (skunkbush sumac) singly or in combination. It may in similar environments elsewhere in the interior western US. ..... **.....A3730 Fallugia paradoxa - Rhus trilobata Shrubland Alliance***

A10b. This alliance is characterized by shrublands dominated by *Amelanchier utahensis* (Utah serviceberry), *Cercocarpus montanus* (alderleaf mountain-mahogany) or *Cercocarpus intricatus* (littleleaf mountain mahogany) in the southern Rocky Mountains, Wyoming Basins, Colorado Plateau and extending west into the Great Basin. ..... **.. A3732 Amelanchier utahensis - Cercocarpus montanus - Cercocarpus intricatus Shrubland Alliance**

G271 Rocky Mountain-North Pacific Subalpine-Montane Mesic Grassland & Meadow

A11a. This mesic meadow alliance is dominated by graminoids *Poa secunda* (Sandberg bluegrass), *Muhlenbergia richardsonis* (mat muhly), *Poa cusickii* (Cusick's bluegrass), and/or *Carex douglasii* (Douglas' sedge) and found in deep-soil, moist meadows at low to high elevations throughout the interior of the western U.S. ..... **..A4165 Poa secunda - Muhlenbergia richardsonis - Carex douglasii Moist Meadow Alliance**

A11b. Vegetation is not as above. *Poa secunda* (Sandberg bluegrass), *Muhlenbergia richardsonis* (mat muhly), *Poa cusickii* (Cusick's bluegrass), and/or *Carex douglasii* (Douglas' sedge) are typically absent or have low cover. **A12**

A12a. This montane mesic meadow alliance is characterized by the dominance of *Carex straminiformis* (Shasta Sedge) or Solidago canadensis (Canada goldenrod) in California and Nevada**.....A4119 Carex straminiformis - Solidago canadensis Meadow Alliance**

A12b. Vegetation is not as above. *Carex straminiformis* (Shasta Sedge) or Solidago canadensis (Canada goldenrod) are typically absent or have low cover. **A13**

A13a. Vegetation is montane mesic meadows that may extend down into the upper foothills. Dominant species include *Agastache urticifolia* (nettleleaf giant hyssop), *Geranium viscosissimum* (sticky purple geranium), *Heliomeris multiflora* (showy goldeneye), *Ligusticum filicinum* (fernleaf licorice-root), *Ligusticum porteri* (Porter's licorice-root), *Ligusticum tenuifolium* (Idaho licorice-root), *Lupinus argenteus* (silvery lupine), or *Lupinus parviflorus ssp. myrianthus* (lodgepole lupine), *Mertensia ciliata* (tall fringed bluebells), *Pteridium aquilinum* (western brackenfern), or *Wyethia amplexicaulis* (mule-ears). *Ligusticum filicinum* (fernleaf licorice-root), *Ligusticum porteri* (Porter's licorice-root), *Ligusticum tenuifolium* (Idaho licorice-root), *Lupinus argenteus* (silvery lupine), or *Lupinus parviflorus ssp. myrianthus* (lodgepole lupine). **A14**

A13b. Vegetation is subalpine/alpine grasslands, meadow or turf characterized by *Agrostis variabilis* (mountain bentgrass), *Calamagrostis* spp. (reedgrass), *Carex filifolia* (threadleaf sedge), *Elymus trachycaulus* (slender wheatgrass), or *Phleum alpinum* (alpine timothy).....**A15**

A14a. This montane mesic meadow alliance is characterized by the dominance of *Agastache urticifolia* (nettleleaf giant hyssop), *Geranium viscosissimum* (sticky purple geranium), *Heliomeris multiflora* (showy goldeneye), *Mertensia ciliata* (tall fringed bluebells), *Pteridium aquilinum* (western brackenfern), or *Wyethia amplexicaulis* (mule-ears). Stands occur in the central Rocky Mountains of Wyoming, Utah and Idaho extending west to ranges in Nevada.... **..... A3950 Agastache urticifolia - Geranium viscosissimum - Pteridium aquilinum Montane Mesic Meadow Alliance**

A14b. This montane mesic meadow alliance is characterized by the dominance of diagnostic species *Ligusticum filicinum* (fernleaf licorice-root), *Ligusticum porteri* (Porter's licorice-root), *Ligusticum tenuifolium* (Idaho licorice-root), *Lupinus argenteus* (silvery lupine), or *Lupinus parviflorus ssp. myrianthus* (lodgepole lupine). Stands occur in the central Rocky Mountains of Wyoming and Idaho extending south to ranges in Colorado..... **A3951 Ligusticum spp. - Lupinus spp. - Delphinium spp. Montane Mesic Meadow Alliance***

A15a. This high-elevation alliance is dominated by *Carex filifolia* (threadleaf sedge) and forms closed to open turf. This dry subalpine short grassland and alpine meadow occurs on slopes and ridges from 1500-3700 m elevation in the Sierra Nevada of California and possibly east into the mountain ranges of western Nevada **. A1294 Carex filifolia Mesic Grassland Alliance**

A15b. Vegetation is not as above. *Carex filifolia* (threadleaf sedge) is typically absent or has low cover. **A16**

A16a. This high-elevation alliance consists of meadows where *Calamagrostis breweri* (shorthair reedgrass) or *Calamagrostis muiriana* (reedgrass) is an important or dominant grass. This alpine and subalpine grassland is found in the Sierra Nevada of California at elevations ranging from 1300-1800 m and occurs on fine-textured soils which are moist for most of the year, often on stream and lake margins..... **..... A3364 Calamagrostis breweri Mesic Grassland Alliance**

A16b. This high-elevation alliance occurs in the upper subalpine to lower alpine mesic meadows and is characterized by the dominance of *Phleum alpinum* (alpine timothy), *Elymus trachycaulus* (slender wheatgrass), or *Agrostis variabilis* (mountain bentgrass). Stands occur in the central Rocky Mountains of Wyoming, Utah and Idaho extending west to ranges in Nevada **..... A3949 Phleum alpinum - Elymus trachycaulus - Agrostis variabilis Subalpine Mesic Meadow Alliance**

G268 Southern Rocky Mountain Montane-Subalpine Grassland

A17a. This grassland alliance is characterized by an open to dense perennial graminoid layer composed of bunchgrasses *Festuca arizonica* (Arizona fescue) and *Muhlenbergia montana* (mountain muhly), which are widespread dominants. It occurs largely in the southern Rocky Mountains extending west to the mountains and high plateaus of Arizona, Utah and Nevada and northeast to the Black Hills. Stands occur primarily in the montane zone (2440-3050 m [8000-10,000 feet]), but may extend down into the foothills..... **.....A3953 Festuca arizonica - Muhlenbergia montana - Poa fendleriana Southern Rocky Mountain Montane Grassland Alliance**

A17b. This grassland alliance is characterized by an open to dense perennial graminoid layer composed of bunchgrasses, especially *Festuca thurberi* (Thurber fescue) and *Danthonia intermedia* (timber oatgrass), with other diagnostic and sometimes dominant species that include *Festuca idahoensis* (Idaho fescue), *Poa lettermanii* (Letterman's bluegrass), and *Poa nervosa* (Wheeler bluegrass). It occurs largely in the southern Rocky Mountains extending west to the high plateaus and mountains of Arizona, Utah and Nevada primarily in the subalpine zone (10, 000-11,500 feet)..... **..... A3954 Festuca thurberi - Danthonia intermedia - Poa lettermanii Southern Rocky Mountain Subalpine Grassland Alliance**

D061 Western North American Interior Chaparral

M1a. This warm interior chaparral macrogroup is centered in mountains in northern Mexico and extends north to central Arizona (Mogollon Rim), southern New Mexico and Trans-Pecos Texas, and west into Sonoran and Mojave desert ranges. Stands are composed of a diverse list of diagnostic, mostly evergreen shrubs such as *Adenostoma sparsifolium* (redshank), *Arctostaphylos pungens*

(pointleaf manzanita), *Arctostaphylos pringlei* (Pringle's manzanita), *Ceanothus greggii* (desert ceanothus), *Cercocarpus montanus var. glaber* (birchleaf mountain-mahogany), *Eriogonum fasciculatum* (Eastern Mojave buckwheat), Fremontodendron californicum (California flannelbush), *Juniperus californica* (California juniper), *Quercus cornelius-mulleri* (Muller oak), or *Quercus john-tuckeri* (Tucker oak). **G2**
..... M091 Warm Interior Chaparral

M1b. This cool interior chaparral macrogroup is centered the interior western U.S. and is composed of cold-hardy dominant and diagnostic species *Arctostaphylos glandulosa* (Eastwood's manzanita), *Arctostaphylos nevadensis* (pinemat manzanita), *Arctostaphylos patula* (greenleaf manzanita), *Ceanothus cordulatus* (whitethorn ceanothus), *Ceanothus diversifolius* (pinemat), *Ceanothus integerrimus* (deerbrush), *Ceanothus pinetorum* (Coville ceanothus), *Ceanothus sanguineus* (redstem ceanothus) (in Oregon), *Ceanothus velutinus* (snowbrush ceanothus), *Chrysolepis sempervirens* (bush chinquapin), *Garrya flavescens* (ashy silktassel), *Holodiscus discolor* (oceanspray), *Prunus emarginata* (bitter cherry), *Prunus subcordata* (Klamath plum), *Purshia stansburiana* (Stansbury cliffrose), *Quercus garryana var. breweri* (Oregon white oak), *Quercus sadleriana* (deer oak), *Quercus vacciniifolia* (huckleberry oak), and *Rhus trilobata* (skunkbush sumac). **G3**
..... M094 Cool Interior Chaparral

M091 Warm Interior Chaparral

G2a. This chaparral group is found across the southwestern U.S. from central New Mexico and southern Utah west to California and is characterized by a moderate to dense evergreen shrub layer dominated by sclerophyllous shrubs, especially *Adenostoma sparsifolium* (redshank), *Arctostaphylos pungens* (pointleaf manzanita), *Ceanothus greggii* (desert ceanothus), *Cercocarpus montanus* (alderleaf mountain-mahogany), Fremontodendron californicum (California flannelbush), *Garrya wrightii* (Wright's silktassel), *Juniperus californica* (California juniper), *Mortonia utahensis* (Utah mortonia), *Quercus cornelius-mulleri* (Muller oak), *Quercus john-tuckeri* (Tucker oak), and *Quercus turbinella* (Sonoran scrub oak), that occurs in foothills, xeric mountain slopes and canyons. **A10**
..... G281 Western Madrean Chaparral

G2b. This chaparral group occurs in the Madrean Oriental in northern Mexico and desert mountains across Trans-Pecos Texas and Guadalupe Mountains in New Mexico and is characterized by a moderate to dense shrub canopy dominated by evergreen shrub oak specis *Quercus intricata (dwarf oak), Quercus laceyi* (Lacey oak), *Quercus pungens* (pungent oak), *Quercus vaseyana* (sandpaper oak), and other chaparral species such as *Acacia roemeriana* (roundflower catclaw), *Ceanothus greggii* (desert ceanothus), *Cercocarpus montanus* (alderleaf mountain-mahogany), *Fallugia paradoxa* (Apache plume), *Fendlera rigida* (stiff fendlerbush), *Fraxinus greggii* (Gregg's ash), *Garrya ovata* (eggleaf silktassel), *Garrya wrightii* (Wright's silktassel), *Juniperus pinchotii* (Pinchot's juniper), *Purshia mexicana* (Mexican cliffrose), *Rhus virens var. choriophylla* (evergreen sumac), *Salvia lycioides* (canyon sage), *Salvia regla* (mountain sage), *Salvia roemeriana* (cedar sage), and *Sophora secundiflora* (mescal bean) that occur on foothills, mountain slopes and canyons. ..... **G280 Eastern Madrean Chaparral***

M094 Cool Interior Chaparral

G3a. This western North American group consists of montane chaparral scrublands dominated by a variety of species, including *Arctostaphylos patula* (greenleaf manzanita), *Arctostaphylos mewukka* (Indian manzanita), *Arctostaphylos nevadensis* (pinemat manzanita), *Arctostaphylos viscida* (sticky whiteleaf manzanita), *Ceanothus cordulatus* (whitethorn ceanothus), *Ceanothus velutinus* (snowbrush ceanothus), *Ceanothus integerrimus* (deerbrush), *Ceanothus martinii* (Martin's ceanothus), *Chrysolepis sempervirens* (bush chinquapin), *Holodiscus discolor* (oceanspray), *Prunus emarginata* (bitter cherry), *Quercus garryana var. breweri* (Oregon white oak), *Quercus sadleriana* (deer oak), and/or *Quercus vacciniifolia* (huckleberry oak). **A4**
.....G282 Western North American Montane Sclerophyll Scrub

G3b. There is only one Group within this Macrogroup.

G282 Western North American Montane Sclerophyll Scrub

A4a. This alliance consists of shrublands dominated or codominated by *Arctostaphylos patula* (greenleaf manzanita) or *Arctostaphylos nevadensis* (pinemat manzanita). They are often monotypic stands with few other shrubs. Other shrubs may be present to codominant such as *Artemisia tridentata* (big sagebrush), *Ceanothus cordulatus* (whitethorn ceanothus), *Ceanothus velutinus* (snowbrush ceanothus), *Ceanothus integerrimus* (deerbrush), or *Ceanothus martinii* (Martin's ceanothus). These montane shrublands occur on the eastern slope of the Sierra Nevada and into the western Great Basin and Colorado Plateau and are found mostly on steep, usually south-facing slopes, where soils are rocky and well-drained. ...

.....A0788 Arctostaphylos patula - Arctostaphylos nevadensis Shrubland Alliance

A4b. Vegetation is not as above. *Arctostaphylos patula* (greenleaf manzanita) and *Arctostaphylos nevadensis* (pinemat manzanita) are absent or have low cover. **A5**

A5a. This widespread shrubland alliance is dominated or codominated by *Ceanothus velutinus* (snowbrush ceanothus). Other shrubs may be present to codominant such as *Artemisia tridentata* (big sagebrush) or *Prunus emarginata*. Mature stands have a uniform layer of tall shrubs 1-2 m in height. It occurs on montane slopes in the western U.S., including the Black Hills of South Dakota. **.....A3936 Ceanothus velutinus Shrubland Alliance**

A5b. Vegetation is not as above. *Ceanothus velutinus* (snowbrush ceanothus) is absent or has low cover. **A6**

A6a. This alliance consists of shrublands dominated or codominated by *Prunus emarginata* (bitter cherry) or *Holodiscus discolor* (oceanspray). Other shrubs may be present with lower cover including *Amelanchier alnifolia* (Saskatoon serviceberry), *Arctostaphylos patula* (greenleaf manzanita), *Artemisia tridentata* (big sagebrush), *Ceanothus cordulatus* (whitethorn ceanothus), *Ceanothus cuneatus* (buckbrush), *Ceanothus integerrimus* (deerbrush), *Ceanothus velutinus* (snowbrush ceanothus), *Cercocarpus ledifolius* (curl-leaf mountain-mahogany), *Garrya fremontii* (bearbrush), *Prunus andersonii* (desert peach), *Quercus sadleriana* (deer oak), and *Quercus vacciniifolia* (huckleberry oak). Stands are generally found between 700 and 2800 m elevation in California, but more common at higher elevations. It is widespread in montane to subalpine zones where it occurs on ridges, montane slopes, rocky chutes, moraines, and talus. **A7**

.....A3918 Prunus emarginata - Holodiscus discolor Shrubland Alliance

A6b. Vegetation is not as above. *Prunus emarginata* (bitter cherry) or *Holodiscus discolor* (oceanspray) are absent or have low cover. .....

A7a. This shrubland alliance is dominated by either *Ceanothus cordulatus* (whitethorn ceanothus) or *Ceanothus integerrimus* (deerbrush), with other montane chaparral shrubs. This alliance occurs in cismontane California and mountains of southern Oregon. Stands occur on well-drained soils and are best developed on dry, exposed sites such as along ridges and upper slopes, between 300 and 2100 m elevation. .....

..... A3917 Ceanothus cordulatus - Ceanothus integerrimus Shrubland Alliance*

A7b. Vegetation is not as above. Vegetation is dominated by *Quercus* (oak) species. **A8**

A8a. This shrubland alliance is dominated by *Quercus vacciniifolia* (huckleberry oak) and/or *Chrysolepis sempervirens* (bush chinquapin). This alliance occurs from Oregon to the southern Sierra Nevada of California along ridges and upper slopes between 700 and 3300 m in elevation. .....

..... A3916 Quercus vacciniifolia - Chrysolepis sempervirens Shrubland Alliance

A8b. Vegetation is not as above. *Quercus vacciniifolia* (huckleberry oak) and/or *Chrysolepis sempervirens* (bush chinquapin) are absent or have low cover. **A9**

A9a. This shrubland alliance is dominated by *Quercus sadleriana* (deer oak) and/or *Lithocarpus densiflorus var. echinoides* (tanoak). It is found in the Klamath-Siskiyou Mountains of southern Oregon and California, as well as along the foothills of the central Sierra Nevada. Stands commonly occur after disturbance from fire or logging along ridges and upper slopes between 600 and 3300 m elevation. .....

..... A4117 Quercus sadleriana - Lithocarpus densiflorus var. echinoides Shrubland Alliance

A9b. This alliance consists of the shrub forms of *Quercus garryana* (Oregon white oak) where they are dominant or codominant with several other shrub species such as *Amelanchier* (serviceberry), *Arctostaphylos* (manzanita), *Ceanothus* (ceanothus), *Cercocarpus* (mountain mahogany), *Fraxinus* (ash), *Prunus* (plum), and/or shrubby forms of *Quercus* (oak). It occurs in the northern Coast Ranges, Klamath Mountains, Modoc Plateau, Sierra Nevada and foothills, and southern Cascades of California, and is likely to occur in Oregon. .....

.....A3919 Quercus garryana var. fruticosa Shrubland Alliance

G281 Western Madrean Chaparral

A10a. Vegetation is dominated by chaparral species *Arctostaphylos pungens* (pointleaf manzanita), *Arctostaphylos pringlei* (Pringle's manzanita), *Ceanothus greggii* (desert ceanothus), *Cercocarpus montanus* (alderleaf mountain-mahogany), *Eriogonum fasciculatum* (Eastern Mojave buckwheat) and/or *Mortonia utahensis* (Utah mortonia). **A11**

* Indicates that NVC unit is peripheral to the CBR key area and may not be present.

A10b. Vegetation is dominated by *Fremontodendron californicum* (California flannelbush), *Juniperus californica* (California juniper) and/or by oak species *Quercus turbinella* (Sonoran scrub oak), *Quercus cornelius-mulleri* (Muller oak), and *Quercus john-tuckeri* (Tucker oak).**A13**

A11a. This evergreen shrubland alliance is dominated or codominated by *Arctostaphylos pungens* (pointleaf manzanita), *Arctostaphylos pringlei* (Pringle's manzanita), *Ceanothus greggii* (desert ceanothus), and *Mortonia utahensis* (Utah mortonia). This chaparral alliance occurs from Nevada to New Mexico on dry mountain slopes ranging from 980-2470 m elevation depending on aspect. .....
A3790 Arctostaphylos pungens - Arctostaphylos pringlei - Ceanothus greggii Chaparral Alliance

A11b. Vegetation is dominated or codominated by *Cercocarpus montanus* (alderleaf mountain-mahogany). If present, *Arctostaphylos pungens* (pointleaf manzanita) and *Arctostaphylos pringlei* (Pringle's manzanita) have low cover. **A12**

A12a. This shrubland alliance is dominated by *Cercocarpus montanus* (alderleaf mountain-mahogany) in the Chihuahuan Desert of New Mexico, Arizona, and northern Mexico. Stands occur from foothill to lower montane elevational zones in desert mountain ranges and along the Mogollon Rim. **.... A3791 Cercocarpus montanus Madrean Montane Chaparral Alliance***

A12b. This shrubland alliance is characterized by the co-importance of *Cercocarpus montanus var. glaber* (birchleaf mountain-mahogany) and *Eriogonum fasciculatum* (Eastern Mojave buckwheat). This chaparral occurs in California's southern mountains and the western margins of the Mojave and Colorado deserts, and Baja California in a wide variety of habitats. **..... A3792 Cercocarpus montanus - Eriogonum fasciculatum - Adenostoma sparsifolium Western Mojave Desert Chaparral Alliance**

A13a. This chaparral alliance includes evergreen shrublands dominated or codominated by *Quercus turbinella* (Sonoran scrub oak) that typically forms thickets with other shrubs. It is found on steep, rocky slopes in the mountains of Arizona, Nevada, New Mexico, and western Texas, often on sheltered slopes in limestone canyons. .....
..... A0793 Quercus turbinella Chaparral Alliance

A13b. This chaparral alliance is characterized by evergreen scrub oak species and other sclerophyllous shrubs with dominant and diagnostic species such as *Ceanothus greggii* (desert ceanothus), *Fremontodendron californicum* (California flannelbush), *Juniperus californica* (California juniper), *Quercus cornelius-mulleri* (Muller oak), or *Quercus john-tuckeri* (Tucker oak). It occurs from arid, interior southern California and adjacent Mojave and Colorado deserts.....
...A3793 Quercus john-tuckeri - Quercus cornelius-mulleri - Fremontodendron californicum Chaparral Alliance*

3.A.2 Warm Desert & Semi-Desert Scrub & Grassland

D039 North American Warm Desert Scrub & Grassland

M1a. This upland warm desert thornscrub and grassland macrogroup contains disturbed semi-arid grasslands and desert thornscrub that are dominated by non-native species (usually >90% relative cover non-native) and are found in the southwestern U.S. and northern Mexico. Characteristic shrub species include *Caesalpinia gilliesii* (bird-of-paradise shrub) or invasive native species *Prosopis glandulosa* (honey mesquite) or *Prosopis velutina* (velvet mesquite) with >90% relative cover and >10% absolute shrub cover. Also included are any desert scrub with an herbaceous layer strongly dominated by a non-native herbaceous species (usually >90% relative cover) so that the natural understory cannot be determined (usually >90% relative cover non-native). If herbaceous cover then < 10% then treat as sparse understory natural type. Characteristic non-native understory species include *Brassica nigra* (black mustard), *Brassica tournefortii* (Asian mustard), *Bromus madritensis* (compact brome), *Bromus rubens* (red brome), *Cynodon dactylon* (Bermudagrass), *Centaurea* (knapweed) spp., *Eragrostis lehmanniana* (Lehmann's lovegrass), *Erodium cicutarium* (redstem stork's bill), and *Schismus barbatus* (common Mediterranean grass). **G2**
..... M512 North American Warm Desert Ruderal Scrub & Grassland

M1b. Upland and xeric wash warm desert scrub and grasslands that are dominated by native species and found in the southwestern U.S. and northern Mexico. .....**M087 Chihuahuan Desert Scrub***
..... M086 Chihuahuan Semi-Desert Grassland*
..... M088 Mojave-Sonoran Semi-Desert Scrub*
..... M117 North American Warm Semi-Desert Cliff, Scree & Rock Vegetation*
..... M092 North American Warm-Desert Xeric-Riparian Scrub*
..... M089 Viscaino-Baja California Desert Scrub*

M512 North American Warm Desert Ruderal Scrub & Grassland

G2a. This ruderal group occurs in Arizona and northern Mexico and includes all exotic-dominated herbaceous stands without a shrub layer. Characteristic understory species include *Brassica nigra* (black mustard), *Brassica tournefortii* (Asian mustard), *Bromus madritensis* (compact brome), *Bromus rubens* (red brome), *Eragrostis lehmanniana* (Lehmann's lovegrass), *Erodium cicutarium* (redstem stork's bill), and *Schismus barbatus* (common Mediterranean grass).....**G3**
..... G677 North American Warm Desert Ruderal Grassland

G2b. This variable ruderal scrub group occurs in Arizona, New Mexico, western Texas and northern Mexico and includes upland desert scrub dominated by exotic shrub species such as *Caesalpinia gilliesii* (bird-of-paradise shrub) or invasive native species (*Prosopis glandulosa* (honey mesquite) and *Prosopis velutina* (velvet mesquite)) with >90% relative cover and >10% absolute shrub cover. Also included are any desert scrub with an herbaceous layer strongly dominated by an exotic herbaceous species (>90% relative cover). Characteristic exotic understory species include *Brassica nigra* (black mustard), *Brassica tournefortii* (Asian mustard), *Bromus madritensis* (compact brome), *Bromus rubens* (red brome), *Cynodon dactylon* (Bermudagrass), *Centaurea* (knapweed) spp., *Eragrostis lehmanniana* (Lehmann's lovegrass), *Erodium cicutarium* (redstem stork's bill), and *Schismus barbatus* (common Mediterranean grass).....**A8**
..... G819 North American Warm Desert Ruderal Scrub

G677 North American Warm Desert Ruderal Grassland

A3a. This alliance includes disturbed prairie invaded by native cacti, *Opuntia imbricata* (cane cholla) that is found in eastern New Mexico and Texas.....
..... A0878 Opuntia imbricata Ruderal Cacti Scrub Alliance*

A3b. Vegetation is not as above. Grassland is not dominated by *Opuntia imbricata* (cane cholla). **A4**

A4a. Vegetation is dominated by annual non-native species.....**A5**
A4b. Vegetation is dominated by perennial non-native species **A6**

A5a. The ruderal grass alliance is dominated by *Bromus rubens* (red brome), *Schismus arabicus* (Arabian schismus), and/or *Schismus barbatus* (common Mediterranean grass) with other non-natives in the herbaceous layer. This alliance is found in California in all topographic settings and on soil textures.....
... A4121 Bromus rubens - Schismus arabicus - Schismus barbatus Ruderal Desert Grassland Alliance

A5b. This ruderal forb alliance is dominated by *Brassica nigra* (black mustard), *Brassica tournefortii* (Asian mustard), or *Malcolmia africana* (African mustard). The alliance is found

on low level bottoms at flat or variable aspects, typically on disturbed desert areas of California and Arizona. ..... **..... A4166 Brassica tournefortii - Malcolmia africana Ruderal Desert Forbs Alliance**

A6a. This alliance comprises improved pastures and disturbed riverbanks dominated by the non-native grass *Cynodon dactylon* (Bermudagrass)..... **..... A4081 Cynodon dactylon Ruderal Desert Grassland Alliance**

A6b. Vegetation is not as above. Grassland is not dominated by *Cynodon dactylon* (Bermudagrass).....**A7**

A7a. This desert grassland/steppe alliance occurs in southeastern Arizona and is characterized by dominance or codominance of *Eragrostis lehmanniana* (Lehmann's lovegrass), an introduced perennial forage grass. ..... **..... A2687 Eragrostis lehmanniana - Eragrostis curvula Ruderal Desert Grassland Alliance***

A7b. This alliance consists of grasslands where *Pennisetum setaceum* (crimson fountaingrass) and/or *Pennisetum ciliare* (buffelgrass) or other *Pennisetum* (fountaingrass) species are dominant or codominant with other non-native species in the herbaceous layer. It is found in California, in frost-free regions, primarily coastal, but extending east into the edges of the Colorado Desert. Habitats are steep coastal cliffs, bluffs, road-cuts, coastal dunes, coastal scrub, and desert scrub. ..... **..... A3873 Pennisetum setaceum - Pennisetum ciliare Ruderal Grassland Alliance***

G819 North American Warm Desert Ruderal Scrub

A8a. This open-canopied ruderal shrubland alliance occurs in the Tularosa Basin and the southern Jornada del Muerto in south-central New Mexico and western Texas. It is characterized by patchy, large-diameter *Prosopis glandulosa* (honey mesquite) shrubs forming coppice dunes on a sandsheet. The surface topography is characterized by rolling sandy hummocks or steep dunes, but there is no overall aspect dominance. ..... **.....A3135 Prosopis glandulosa Ruderal Desert Sand Scrub Alliance***

A8b. Vegetation may be dominate by *Prosopis* (mesquite) spp. shrubs but does not form coppice dunes on a sandsheet. Soils are variable and may include sandy loams. **A9**

A9a. This widespread ruderal alliance occurs as invasive upland shrublands found in former semi-desert grasslands in the foothills and piedmonts of the Chihuahuan Desert, extending west into the Sky Island region of southern Arizona and adjacent Mexico, and north into the lower Mogollon Rim foothills. The open to dense, tall (2-5 m) to short (<2 m) shrub layer is dominated by *Prosopis glandulosa* (honey mesquite) with typically low cover of desert grasses. **..... A3162 Prosopis glandulosa Ruderal Desert Scrub Alliance***

A9b. This widespread ruderal alliance occurs as invasive upland shrublands found in former semi-desert grasslands in the foothills and piedmonts in the Sky Island region of southern Arizona and adjacent Mexico, and north into the lower Mogollon Rim foothills. The open to dense, tall (2-5 m) to short (<2 m) shrub layer is dominated by *Prosopis velutina* (velvet mesquite) with typically low cover of desert grasses. ..... **..... A3163 Prosopis velutina Ruderal Desert Scrub Alliance***

3.B.1 Cool Semi-Desert Scrub & Grassland

D040 Western North American Cool Semi-Desert Scrub & Grassland

M1a. Upland macrogroup of ruderal semi-desert scrub and grasslands dominated by non-native (usually >90% relative cover) and generalist native species in cool semi-desert areas of U.S. Characteristic non-native species are *Acroptilon repens* (hardheads), *Agropyron cristatum* (crested wheatgrass), *Alhagi maurorum* (camelthorn), *Brassica nigra* (black mustard), *Bromus tectorum* (cheatgrass), *Bromus hordeaceus* (soft brome), *Bromus madritensis* (compact brome), *Cardaria draba* (whitetop), several *Centaurea* (knapweed/star-thistle) species, *Crupina vulgaris* (common crupina), *Cynoglossum officinale* (gypsyflower), *Cytisus striatus* (striated broom), *Euphorbia esula* (leafy spurge), *Halogeton glomeratus* (saltlover), *Hyoscyamus niger* (black henbane), *Hypericum perforatum* (common St. Johnswort), *Isatis tinctoria* (Dyer's woad), *Lepidium latifolium* (broadleaved pepperweed), *Linaria dalmatica* (Dalmatian toadflax), *Linaria vulgaris* (butter and eggs), *Peganum harmala* (harmal peganum) *Salsola tragus* (prickly Russian thistle), *Taeniatherum caput-medusae* (medusahead), and *Zygophyllum fabago* (Syrian beancaper). If shrub layer is mostly native (such as *Artemisia tridentata* (big sagebrush), *Atriplex confertifolia* (shadscale saltbush), *Chrysothamnus viscidiflorus* (yellow rabbitbrush), *Ericameria nauseosa* (rubber rabbitbrush), *Grayia spinosa* (spiny hopsage), and *Gutierrezia sarothrae* (broom snakeweed)), then a significant

herbaceous layer (>10% cover) is present and strongly dominated by non-native species so that the natural understory cannot be determined (usually >90% relative cover non-native). If herbaceous cover < 10% then treat as a sparse understory natural type. **G7**

..... M499 Western North American Cool Semi-Desert Ruderal Scrub & Grassland

M1b. Upland macrogroup of cool semi-desert scrub, dry grasslands, shrub steppe, shrublands, and sparse vegetation dominated by native species. If herbaceous understory is present, then not strongly dominated (>90% relative cover) by non-native species. **M2**

M2a. Macrogroup of shrublands along dry washes and valley floors, dominated by *Atriplex canescens* (fourwing saltbush), *Ericameria nauseosa* (rubber rabbitbrush), *Artemisia tridentata ssp. tridentata* (basin big sagebrush), *Atriplex canescens* (fourwing saltbush), *Atriplex confertifolia* (shadscale saltbush), *Brickellia* (brickellbush) spp., *Ephedra* (joint-fir) spp., *Ericameria nauseosa* (rubber rabbitbrush), and/or *Fraxinus anomala* (singleleaf ash). **G8**

..... M095 Great Basin-Intermountain Xeric-Riparian Scrub

M2b. Upland semi-desert shrublands, scrub, dry grasslands and sparse vegetation dominated by native species. **M3**

M3a. Macrogroup where vegetation is controlled by lithography, such as cliffs, screes and badlands. Vascular plant cover is generally low (<10%), often patchy with up to 15% total cover in some areas. Many of the characteristic species also occur in non-sparse vegetation macrogroups, although some of the sites with harsh soil properties (badlands) may have endemic species. Characteristic trees or shrubs include species of *Artemisia* (sagebrush), *Atriplex* (saltbush), *Cercocarpus* (mountain mahogany), *Eriogonum* (buckwheat), *Fallugia*, *Grayia*, *Juniperus* (juniper), *Pinus* (pine), *Purshia* (bitterbrush), and others. Variety of landscapes / exposed rock and badland substrates; Columbia Plateau south to the Great Basin and Colorado Plateau, east into Wyoming basins. Sparsely vegetated dune scrub and grassland sand sheets are not included. **G9**

..... M118 Intermountain Basins Cliff, Scree & Badland Sparse Vegetation

M3b. Semi-desert scrub, dry grasslands, shrub steppe, and shrublands characterized by a variety of species including sparsely vegetated dune scrub and grassland sand sheets. **M4**

M4a. Widespread cool semi-desert macrogroup centers west of the Rockies; typically composed of *Artemisia pedatifida* (birdfoot sagebrush), *Artemisia pygmaea* (pygmy sagebrush), *Atriplex corrugata* (mat saltbush), or *Atriplex gardneri* (Gardner's saltbush) dominated dwarf-shrublands and various saltbush shrublands dominated by *Atriplex canescens* (fourwing saltbush), *Atriplex confertifolia* (shadscale saltbush), *Atriplex cuneata* (valley saltbush), *Atriplex lentiformis* (big saltbush), *Atriplex obovata* (mound saltbush), *Atriplex polycarpa* (cattle saltbush), and *Atriplex spinifera* (spinescale saltbush). Shrubs dominate either singly or mixed; substrates are typically saline, alkaline, fine-textured soils developed from shale or alluvium. **G10**

..... M093 Great Basin Saltbush Scrub

M4b. Semi-desert scrub, dry grasslands, shrub steppe, and shrublands characterized by a variety of species including sparsely vegetated dune scrub and grassland sand sheets. If present, species of *Atriplex* (Saltbush), *Artemisia pedatifida* (birdfoot sagebrush) or *Artemisia pygmaea* (pygmy sagebrush) have low cover. **M5**

M5a. Shrub steppe, shrublands, and dwarf-shrublands characterized by a variety of woody *Artemisia* (sagebrush) species, such as *Artemisia arbuscula* (little sagebrush), *Artemisia bigelovii* (Bigelow sage), *Artemisia cana* (silver sagebrush), *Artemisia frigida* (prairie sagewort), *Artemisia nova* (black sagebrush), *Artemisia papposa* (Owyhee sage), *Artemisia rigida* (scabland sagebrush), *Artemisia tridentata* (big sagebrush), *Artemisia tripartita* (threetip sagebrush). Other shrubs include *Chamaebatiaria millefolium* (fernbush), *Eriogonum* (buckwheat) dwarf-shrub species, *Purshia tridentata* (antelope bitterbrush), *Salvia dorrii* (purple sage), or *Symphoricarpos* (snow berry) species. **M6**

M5b. Diverse macrogroup of the semi-arid interior western U.S. Includes open shrublands, dwarf-shrublands, shrub herbaceous, or grasslands. Characteristic species include shrubs *Chrysothamnus viscidiflorus* (yellow rabbitbrush), *Coleogyne ramosissima* (blackbrush), *Ephedra* (joint-fir) spp., *Ericameria nauseosa* (rubber rabbitbrush), *Gutierrezia sarothrae* (broom snakeweed), *Krascheninnikovia lanata* (winterfat), and dry grasses such as *Achnatherum hymenoides* (Indian ricegrass), *Achnatherum lettermanii* (Letterman's needlegrass), *Aristida purpurea* (purple threeawn), *Bouteloua gracilis* (blue grama), *Hesperostipa comata* (needle-and-thread), *Leymus salinus ssp. salinus* (saline wildrye), *Muhlenbergia pungens* (sandhill muhly), *Pleuraphis jamesii* (James' galleta), *Poa fendleriana* (muttongrass), *Poa secunda* (Sandberg bluegrass), *Pseudoroegneria spicata* (bluebunch wheatgrass), *Sporobolus cryptandrus* (sand dropseed), and *Sporobolus airoides* (alkali sacaton). Mid-elevation sites in eastern and central Mojave Desert, Great Basin, Colorado Plateau,

Columbia Plateau; lower elevation sites in the central Rocky Mountains east across Wyoming Basins into the western Great Plains.....**G11**
..... M171 Great Basin-Intermountain Dry Shrubland & Grassland

M6a. Shrubland macrogroup of the big sagebrush shrubland and shrub-steppe that is common throughout much of the interior western U.S.; dominated by *Artemisia tridentata* (big sagebrush), *Purshia tridentata* (antelope bitterbrush), and several local dominants such as *Artemisia cana* (silver sagebrush) and *Artemisia tripartita ssp. tripartita* (threetip sagebrush).....**G15**
M169 Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland

M6b. A macrogroup of the interior western U.S. characterized by short sagebrush taxa that form an open to moderately dense dwarf-shrub layer on shallow, rocky, calcareous or alkaline soils. Dominated by one of several diagnostic *Artemisia* (sagebrush) taxa depending on location and habitat including *Artemisia arbuscula* (little sagebrush), *Artemisia bigelovii* (Bigelow sage), *Artemisia frigida* (prairie sagewort), *Artemisia nova* (black sagebrush), *Artemisia papposa* (Owyhee sage), *Artemisia rigida* (scabland sagebrush), or *Artemisia tripartita ssp. rupicola* (Wyoming threetip sagebrush). **G17**
..... M170 Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland

M499 Western North American Cool Semi-Desert Ruderal Scrub & Grassland

G7a. Ruderal shrubland and grassland group includes vegetation strongly dominated by invasive, exotic species. Also includes shrubland and shrub-steppe with mostly native shrubs but where a significant herbaceous layer (>10% cover) is strongly dominated by non-native species (usually >90% relative cover non-native).....**A18**
..... G600 Great Basin-Intermountain Ruderal Dry Shrubland & Grassland

G7b. Vegetation is not as above. There is only one group in this macrogroup. .....

M095 Great Basin-Intermountain Xeric-Riparian Scrub

G8a. Sparsely to densely vegetated shrublands that occur along dry watercourses that experience periodic flash flooding. **A23**
..... G559 Great Basin-Intermountain Shrub & Herb Wash-Arroyo

G8b. Vegetation is not as above. There is only one group in this macrogroup. .....

M118 Intermountain Basins Cliff, Scree & Badland Sparse Vegetation

G9a. This group consists of barren and sparsely vegetated cliffs, scree slopes, badlands and other similar harsh habitats from low to high elevations, with a wide variety of trees or shrubs. **A24**
.....G570 Intermountain Basins Cliff, Scree & Badland Sparse Vegetation

G9b. Vegetation is not as above. There is only one group in this macrogroup. .....

M093 Great Basin Saltbush Scrub

G10a. This dwarf-shrub scrub group occurs on gentle slopes and rolling plains in the Colorado Plateau and Uinta Basin on Mancos shale and arid, windswept basins and plains across parts of Wyoming and Montana. Characterized by an open canopy of dwarf-shrubs composed of *Artemisia pedatifida* (birdfoot sagebrush), *Atriplex corrugata* (mat saltbush), or *Atriplex gardneri* (Gardner's saltbush) sometimes with *Artemisia longifolia* (longleaf wormwood), *Artemisia pygmaea* (pygmy sagebrush), or *Picrothamnus desertorum* (bud sagebrush) dominant or codominant.....**A27**
.....G301 Intermountain Dwarf Saltbush - Sagebrush Scrub

G10b. Widespread semi-arid scrub group of basins, plains, alluvial flats and slopes in the intermountain western U.S. and western Great Plains; characterized by a variable shrub layer dominated or codominated by *Atriplex canescens* (fourwing saltbush), *Atriplex confertifolia* (shadscale saltbush), *Atriplex cuneata* (valley saltbush), *Atriplex hymenelytra* (desertholly), *Atriplex obovata* (mound saltbush), *Atriplex polycarpa* (cattle saltbush), *Grayia spinosa* (spiny hopsage), and/or *Picrothamnus desertorum* (bud sagebrush) often with other shrubs present to codominant.....**A28**
..... G300 Intermountain Shadscale - Saltbush Scrub

M171 Great Basin-Intermountain Dry Shrubland & Grassland

G11a. This shrubby and herbaceous group occurs on sandy sites in the intermountain western U.S. and is characterized by a sparse to open layer of shrubs *Ericameria nauseosa* (rubber rabbitbrush), *Eriogonum leptocladon* (sand buckwheat), or *Tetradymia tetrameres* (fourpart horsebrush) and herbaceous species *Achnatherum hymenoides* (Indian ricegrass), *Leymus*

flavescens (yellow wildrye), *Psoralidium lanceolatum* (lemon scurfpea), and *Redfieldia flexuosa* (blowout grass), which may dominate solely or in a combination on active and stable dunes and sandsheets. **A31**

..... G775 Intermountain Sparsely Vegetated Dune Scrub & Grassland

G11b. Vegetation is not as above. Site is not characterized by dunes or sand sheets although substrates may be composed of sandy soils.....**G12**

G12a. This widespread semi-arid to arid grassland group occurs throughout the intermountain western U.S. and composed of dominant drought-resistant perennial bunchgrasses such as *Achnatherum* (needlegrass) spp., *Bouteloua gracilis* (blue grama), *Hesperostipa comata* (needle-and-thread), *Pleuraphis jamesii* (James' galleta), *Poa cusickii* (Cusick's bluegrass), *Poa secunda* (Sandberg bluegrass), and *Pseudoroegneria spicata* (bluebunch wheatgrass) often with scattered shrubs, especially *Artemisia tridentata* (big sagebrush), *Atriplex* (saltbush) spp., *Coleogyne ramosissima* (blackbrush), *Ephedra* (joint-fir) spp., *Gutierrezia sarothrae* (broom snakeweed), and *Kraschenninnikovia lanata* (winterfat). **A32**

..... G311 Intermountain Semi-Desert Grassland

G12b. Semi-arid scrub or shrubland stands characterized by desert scrub, short trees, shrub, dwarf-shrubs, or stem succulents. **G13**

G13a. Stands dominated by *Artemisia filifolia* (sand sagebrush), *Coleogyne ramosissima* (blackbrush), *Ephedra cutleri* (Cutler's joint-fir), *Ephedra torreyana* (Torrey's joint-fir), *Ephedra viridis* (mormon-tea), *Ericameria cooperi* (Cooper's goldenbush), *Eriogonum fasciculatum* (Eastern Mojave buckwheat), *Eriogonum corymbosum* (crispleaf buckwheat), *Grayia spinosa* (spiny hopsage), *Lycium andersonii* (water jacket), *Menodora spinescens* (spiny menodora), *Nolina* (beargrass) spp., *Opuntia acanthocarpa* (buckhorn cholla), *Poliomintha incana* (frosted mint), *Purshia glandulosa* (desert bitterbrush), *Purshia stansburiana* (Stansbury cliffrose), *Quercus havardii var. tuckeri* (Havard oak), *Salazaria mexicana* (Mexican bladdersage), *Thamnosma montana* (turpentinebroom), r *Vanclevea stylosa* (pillar false gumweed). *Yucca brevifolia* (Joshua tree), or *Yucca schidigera* (Mojave yucca).....**G14**

G13b. This widespread, open to moderately dense dwarf-shrubland, shrubland and shrub-steppe group occurs throughout the semi-arid western U.S. and is characterized by *Chamaebatiaria millefolium* (desert sweet), *Chrysothamnus albidus* (whiteflower rabbitbrush), *Chrysothamnus viscidiflorus* (yellow rabbitbrush), *Ericameria nauseosa* (rubber rabbitbrush), *Ephedra viridis* (mormon-tea), *Ephedra torreyana* (Torrey's joint-fir), *Glossopetalon spinescens* (spiny greasebush), *Gutierrezia sarothrae* (broom snakeweed), *Gutierrezia microcephala* (threadleaf snakeweed), *Ericameria nana* (dwarf goldenbush), *Ericameria parryi* (Parry's rabbitbrush), *Ericameria teretifolia* (green rabbitbrush), *Kraschenninnikovia lanata* (winterfat), *Mahonia fremontii* (Fremont's mahonia), *Opuntia polyacantha* (plains pricklypear), and *Tetradymia canescens* (spineless horsebrush) with or without an herbaceous layer. **A38**

..... G310 Intermountain Semi-Desert Steppe & Shrubland

G14a. This group represents the extensive desert scrub in the transition zone above *Larrea tridentata - Ambrosia dumosa* desert scrub and below the lower montane woodlands (700-1800 m elevation) that occurs in the Mojave Desert and transition zone into the southern Great Basin. Stands are dominated by *Coleogyne ramosissima* (blackbrush), *Ericameria cooperi* (Cooper's goldenbush), *Eriogonum fasciculatum* (Eastern Mojave buckwheat), *Ephedra* (joint-fir) spp., *Eriogonum corymbosum* (crispleaf buckwheat), *Grayia spinosa* (spiny hopsage), *Lycium andersonii* (water jacket), *Menodora spinescens* (spiny menodora), *Nolina* (beargrass) spp., *Opuntia acanthocarpa* (buckhorn cholla), *Purshia glandulosa* (desert bitterbrush), *Purshia stansburiana* (Stansbury cliffrose), *Salazaria mexicana* (Mexican bladdersage), *Thamnosma montana* (turpentinebroom), *Yucca brevifolia* (Joshua tree), or *Yucca schidigera* (Mojave yucca). **A46**

..... G296 Mojave Mid-Elevation Mixed Desert Scrub

G14b. This typically open shrubland group occurs in the Colorado Plateau on sandy substrates and is dominated by *Artemisia filifolia* (sand sagebrush), *Coleogyne ramosissima* (blackbrush), *Ephedra cutleri* (Cutler's joint-fir), *Ephedra torreyana* (Torrey's joint-fir), *Ephedra viridis* (mormon-tea), *Poliomintha incana* (frosted mint), *Quercus havardii var. tuckeri* (Havard oak), or *Vanclevea stylosa* (pillar false gumweed). **A61**

..... G312 Colorado Plateau Blackbrush - Mormon-tea Shrubland

M169 Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland

G15a. This sagebrush shrubland and shrub-steppe group is found at montane and subalpine elevations across the western U.S. and is composed primarily of *Artemisia tridentata ssp.*

vaseyana (mountain big sagebrush), *Artemisia cana ssp. bolanderi* (silver sagebrush), *Artemisia cana ssp. viscidula* (silver sagebrush), and related taxa such as *Artemisia tridentata ssp. spiciformis* (big sagebrush) and *Artemisia rothrockii* (timberline sagebrush) with *Symphoricarpos* (snowberry) spp. often codominant and there is usually an abundant perennial herbaceous layer (over 25% cover). **A67**

..... G304 Intermountain Mountain Big Sagebrush Steppe & Shrubland

G15b. Vegetation dominated not dominated by *Artemisia tridentata ssp. vaseyana* (mountain big sagebrush), *Artemisia cana ssp. bolanderi* (silver sagebrush), *Artemisia cana ssp. viscidula* (silver sagebrush), and *Artemisia tridentata ssp. spiciformis* (spiked big sagebrush) and *Artemisia rothrockii* (timberline sagebrush) are typically absent. **G16**

G16a. This widely distributed, matrix-forming shrubland group is concentrated in the drier, more southerly portions of the interior western U.S., but extends into xeric portions of the Columbia Plateau, Rocky Mountains, across Wyoming into the northwestern Great Plains. Vegetation is typically dominated by *Artemisia tridentata ssp. wyomingensis* (Wyoming big sagebrush) and *Artemisia tridentata ssp. tridentata* (basin big sagebrush), sometimes codominated by xeric shrubs such as *Atriplex* (saltbush) spp., with a typically sparse to open herbaceous layer dominated by dry-site graminoids. **A70**

..... G303 Intermountain Dry Tall Sagebrush Steppe & Shrubland

G16b. This matrix-forming sagebrush steppe and shrubland group occurs throughout the interior western U.S., across Wyoming into the northwestern Great Plains and is characterized by an open to sparse shrub layer of *Artemisia tridentata* (big sagebrush) (ssp. *tridentata*, ssp. *xericensis*) or *Artemisia tripartita ssp. tripartita* (threetip sagebrush) with an often dense herbaceous layer dominated by perennial bunchgrasses such as *Achnatherum occidentale* (western needlegrass), *Festuca campestris* (rough fescue), *Festuca idahoensis* (Idaho fescue), *Leymus cinereus* (basin wildrye), *Poa secunda* (Sandberg bluegrass), and *Pseudoroegneria spicata* (bluebunch wheatgrass). **A72**

..... G302 Intermountain Mesic Tall Sagebrush Steppe & Shrubland

M170 Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland

G17a. This open to moderately dense, semi-arid dwarf-shrubland and steppe occurs throughout the intermountain western U.S. and is dominated by one of the following: *Artemisia arbuscula ssp. arbuscula* (little sagebrush), *Artemisia arbuscula ssp. longicaulis* (little sagebrush), *Artemisia arbuscula ssp. longiloba* (little sagebrush), *Artemisia arbuscula ssp. thermopola* (little sagebrush), *Artemisia bigelovii* (Bigelow sage), *Artemisia frigida* (prairie sagewort), *Artemisia nova* (black sagebrush), or *Artemisia tripartita ssp. rupicola* (Wyoming threetip sagebrush) depending on environment and species distribution. **A75**

..... G308 Intermountain Low & Black Sagebrush Steppe & Shrubland

G17b. This Columbia Plateau group forms extensive low shrublands dominated by diagnostic dwarf-shrubs, *Artemisia rigida* (scabland sagebrush), *Salvia dorrii* (purple sage), and/or diaganostic species of *Eriogonum* (buckwheat) such as *Eriogonum compositum* (arrowleaf buckwheat), *Eriogonum douglasii* (Douglas' buckwheat), *Eriogonum microthecum* (slender buckwheat), *Eriogonum niveum* (snow buckwheat), *Eriogonum sphaerocephalum* (rock buckwheat), *Eriogonum strictum* (Blue Mountain buckwheat), and *Eriogonum thymoides* (thymeleaf buckwheat). **A81**

..... G307 Columbia Plateau Scabland Dwarf-shrubland

G600 Great Basin-Intermountain Ruderal Dry Shrubland & Grassland

A18a. Vegetation is dominated by woody vegetation **A19**

A18b. Vegetation is dominated by herbaceous vegetation. **A20**

A19a. This cool, semi-arid interior western U.S. ruderal shrubland alliance is strongly dominated (>90% relative canopy cover) by invasive, exotic shrub species such as *Alhagi maurorum* (camelthorn), *Cytisus striatus* (striated broom), or *Zygophyllum fabago* (Syrian beancaper) and occurs in disturbed dry to mesic basins, alluvial fans, and foothills at elevations up to 2200 m. **..... A3253 Alhagi maurorum - Zygophyllum fabago Ruderal Shrubland Alliance**

A19b. This cool, semi-arid interior western U.S. ruderal shrubland alliance is dominated by species of *Artemisia* (sagebrush) often with other native shrubs present to codominant. The open to moderate herbaceous understory (generally > 10% cover) strongly dominated (>90% relative cover) by non-native herbaceous species; a widespread example is *Artemisia tridentata* (big sagebrush) / *Bromus tectorum* (cheatgrass) shrubland. .....

..... A4213 Artemisia spp. - Mixed Shrub Ruderal Understory Shrubland Alliance

A20a. Vegetation is dominated by herbaceous annual species. **A21**
A20b. Vegetation is dominated by herbaceous perennial species. **A22**

A21a. This ruderal annual grassland alliance is strongly dominated (>90% relative canopy cover) by invasive, exotic annual grass species such as *Bromus tectorum* (cheatgrass), and less commonly *Bromus arvensis* (field brome), *Bromus hordeaceus* (soft brome), *Bromus madritensis* (compact brome), or *Taeniatherum caput-medusae* (medusahead). It occurs in disturbed dry to mesic basins, alluvial fans, and foothills at elevations up to 2200 m. ..... **..... A1814 Bromus tectorum - Taeniatherum caput-medusae Ruderal Annual Grassland Alliance**

A21b. This ruderal annual herbaceous alliance is strongly dominated (>90% relative canopy cover) by invasive, exotic annual forb species such as *Brassica nigra* (black mustard), *Centaurea melitensis* (Maltese star-thistle), *Centaurea solstitialis* (yellow star-thistle), *Crupina vulgaris* (common crupina), *Cynoglossum officinale* (gypsyflower), *Hyoscyamus niger* (black henbane), *Isatis tinctoria* (Dyer's woad), or *Salsola tragus* (prickly Russian thistle) and occurs in disturbed dry to mesic basins, alluvial fans, and foothills at elevations up to 2200 m. ..... **.. A3257 Centaurea solstitialis - Isatis tinctoria - Salsola tragus Ruderal Annual Forb Alliance**

A22a. This ruderal perennial grassland alliance is strongly dominated (>90% relative canopy cover) by invasive, exotic perennial grasses, especially *Agropyron cristatum* (crested wheatgrass), which can occur as a near-monoculture or mixed grassland with other exotic perennial grasses such as *Poa pratensis* (Kentucky bluegrass) and exotic perennial forbs and annuals. **.....A4148 Agropyron cristatum Western Ruderal Perennial Grassland Alliance**

A22b. This ruderal herbaceous alliance is strongly dominated (>90% relative canopy cover) by invasive, exotic perennial forbs such as *Acroptilon repens* (hardheads), *Cardaria draba* (whitetop), *Centaurea calcitrapa* (red star-thistle), *Centaurea diffusa* (diffuse knapweed), *Centaurea iberica* (Iberian knapweed), *Centaurea biebersteinii* (spotted knapweed), *Centaurea triumfettii* (squarrose knapweed), *Euphorbia esula* (leafy spurge), *Hypericum perforatum* (common St. Johnswort), *Lepidium latifolium* (broadleaved pepperweed), *Linaria dalmatica* (Dalmatian toadflax), *Linaria vulgaris* (butter and eggs), or *Peganum harmala* (harmal peganum) and occurs in disturbed dry to mesic basins, alluvial fans, and foothills at elevations up to 2200 m. ..... **.....A3255 Cardaria draba - Centaurea spp. - Lepidium latifolium Ruderal Perennial Forb Alliance**

G559 Great Basin-Intermountain Shrub & Herb Wash-Arroyo

A23a. This alliance is characterized by low cover of mixed shrubs and is generally dominated by *Atriplex canescens* (fourwing saltbush) and/or *Ericameria nauseosa* (rubber rabbitbrush) with several other shrubs. Stands occurs in cold desert washes of Arizona, Colorado, Nevada and Utah.**..... A3266 Atriplex canescens - Ericameria nauseosa Desert Wash Alliance**
A23b. Currently there is only a single alliance in this Group. .....

G570 Intermountain Basins Cliff, Scree & Badland Sparse Vegetation

A24a. This alliance consists of widely scattered trees and shrubs (with <10% vascular plant cover), including *Atriplex* (saltbush) spp., *Cercocarpus intricatus* (littleleaf mountain mahogany), *Cercocarpus montanus* (alderleaf mountain-mahogany), *Coleogyne ramosissima* (blackbrush), *Juniperus* (juniper) spp., and *Pinus ponderosa* (ponderosa pine). It ranges from Wyoming and Utah west across the intermountain western U.S., is found from foothill to lower montane elevations and includes steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock types. ..... **..... A4051 Pinus ponderosa - Cercocarpus intricatus Bedrock Cliff & Canyon Wooded Scrub Alliance**
A24b. Vegetation consists of various shrubs. **A25**

A25a. This sparsely vegetated alliance (<10% vascular cover) has varied characteristic species such as *Enceliopsis nudicaulis* (nakedstem sunray), *Eriogonum brevicaule* (shortstem buckwheat), *Leymus salinus ssp. salinus* (saline wildrye), *Leymus salinus ssp. salmonis* (Salmon wildrye), *Lupinus argenteus* (silvery lupine), *Pseudoroegneria spicata* (bluebunch wheatgrass), and/or *Zuckia brandegeei* (siltbush). It occurs throughout the Intermountain West on badlands of shales, siltstones or mudstones on typically rounded hills and plains that form a rolling topography that can be steep and highly eroded..... **..... A4052 Ephedra spp. - Leymus salinus - Eriogonum corymbosum Badlands Cold Desert Sparse Vegetation Alliance**

A25b. Site is not badlands of shales, siltstones or mudstones on typically rounded hills and plains.....**A26**

A26a. This sparsely vegetated (<10% vascular plant cover) scrub alliance is composed of *Artemisia bigelovii* (Bigelow sage), *Atriplex canescens* (fourwing saltbush), *Brickellia* (brickellbush) spp., *Chrysothamnus viscidiflorus* (yellow rabbitbrush), *Ephedra viridis* (mormon-tea), *Ericameria nauseosa* (rubber rabbitbrush), *Fallugia paradoxa* (Apache plume), and/or *Rhus trilobata* (skunkbush sumac). It occurs on talus and colluvial slopes in the intermountain western U.S. ..... **..... A4050 Ephedra viridis - Chrysothamnus viscidiflorus - Rhus trilobata Talus Sparse Scrub Alliance**

A26b. This sparsely vegetated (<10% vascular plant cover) scrub and subshrub-dominated is composed of *Artemisia filifolia* (sand sagebrush), *Atriplex canescens* (fourwing saltbush), *Ephedra* (joint-fir) spp., *Eriogonum corymbosum* (crispleaf buckwheat), *Eriogonum ovalifolium* (cushion buckwheat), and/or *Fallugia paradoxa* (Apache plume). It occurs on lava flows, cinder fields, and sand dunes in the intermountain western U.S..... **A4053 Eriogonum ovalifolium - Fallugia paradoxa - Andropogon hallii Lava & Cinder Sparse Vegetation Alliance**

G301 Intermountain Dwarf Saltbush - Sagebrush Scrub

A27a. This low scrub alliance is characterized by a sparse dwarf-shrub layer of *Artemisia pygmaea* (pygmy sagebrush) and occurs in relatively dry areas of the sagebrush desert of Nevada and Utah, from 1200-1800 m in elevation. ..... **..... A1106 Artemisia pygmaea Low Scrub Alliance**

A27b. This low scrub alliance has a very sparse to moderately dense cover of dwarf-shrubs that is dominated by *Atriplex gardneri* (Gardner's saltbush). *Artemisia pedatifida* (birdfoot sagebrush) is absent. Stands occur on mesas, plains, low hills and eroded "badlands" in Colorado Plateau extending into Wyoming and Montana..... **..... A1110 Atriplex gardneri Low Scrub Alliance***

G300 Intermountain Shadscale - Saltbush Scrub

A28a. This scrub alliance is characterized by a sparse to moderately dense shrub layer of *Grayia spinosa* (spiny hopsage). Associates with Mojavean or Great Basin affinities may be present to codominant, however species of *Atriplex* (saltbush) are typically absent or have very low cover. It occurs in the Great Basin and the eastern Mojave Desert..... **..... A3171 Grayia spinosa Scrub Alliance**

A28b. Vegetation is characterized by species of *Atriplex* (saltbush). *Grayia spinosa* (spiny hopsage) may be present to codominant. **A29**

A29a. This scrub alliance is characterized by a sparse to moderately dense shrub layer dominated or codominated by *Atriplex polycarpa* (cattle saltbush). Stands occur in desert valleys, basins, playas, bajadas, foothills and plains. **..... A3174 Atriplex polycarpa Scrub Alliance**

A29b. Vegetation is characterized by other species of *Atriplex* (saltbush). *Grayia spinosa* (spiny hopsage) may be present to codominant. **A30**

A30a. This widespread scrub alliance has a sparse to moderately dense (10-60% cover) short-shrub canopy (approximately 1.5 m tall) that is dominated by the facultative deciduous, xeromorphic shrub *Atriplex canescens* (fourwing saltbush). Other shrubs such as *Artemisia tridentata* (big sagebrush), *Ephedra viridis* (mormon-tea), or *Krascheninnikovia lanata* (winterfat) may codominate. **..... A0869 Atriplex canescens Scrub Alliance**

A30b. This widespread scrub alliance is characterized by a sparse to moderately dense shrub layer dominated or codominated by *Atriplex confertifolia* (shadscale saltbush) and/or *Picrothamnus desertorum* (bud sagebrush). Several other semi-desert shrubs may be present to codominant. **..... A0870 Atriplex confertifolia Scrub Alliance**

G775 Intermountain Sparsely Vegetated Dune Scrub & Grassland

A31a. This herbaceous alliance occurs on sandy sites in the intermountain western U.S. and is characterized by a sparse to an open herbaceous layer composed of *Redfieldia flexuosa* (blowout grass), *Leymus flavescens* (yellow wildrye), *Achnatherum hymenoides* (Indian ricegrass), and *Psoralidium lanceolatum* (lemon scurfpea), which may dominate solely or in combination on active and stable dunes and sandsheets..... **..... A4011 Redfieldia flexuosa - Leymus flavescens - Achnatherum hymenoides Grassland Alliance**

A31b. This scrub alliance includes sparsely vegetated scrub of sand dunes, sandsheets and sand blowouts of the western U.S. dominated by *Ericameria nauseosa* (rubber rabbitbrush), *Eriogonum leptocladon* (sand buckwheat), and/or *Tetradymia tetrameres* (fourpart horsebrush), with herbaceous understory of sand indicator species such as *Achnatherum hymenoides* (Indian ricegrass), *Leymus flavescens* (yellow wildrye), *Muhlenbergia pungens* (sandhill muhly), and/or *Psoralidium lanceolatum* (lemon scurfpea). ..... **..... A4149 Ericameria nauseosa - Eriogonum leptocladon - Tetradymia tetrameres Sparse Scrub Alliance**

G311 Intermountain Semi-Desert Grassland

A32a. This herbaceous alliance is dominated by perennial forbs such as *Sphaeralcea ambigua* (desert globemallow), often codominant with *Sphaeralcea coccinea* (scarlet globemallow) and/or *Sphaeralcea parvifolia* (small-leaf globemallow). Stands occur across the western US. **.. A4216 Sphaeralcea ambigua - Sphaeralcea coccinea - Sphaeralcea parvifolia Dry Meadow Alliance**

A32b. Vegetation is dominated by an herbaceous layer largely composed of perennial grasses. **A33**

A33a. This grassland alliance is dominated by *Achnatherum speciosum* (desert needlegrass), which is the sole dominant or important plant in the herbaceous layer. Stands occur in the Mojave Desert. **..... A1290 Achnatherum speciosum Grassland Alliance**

A33b. Vegetation is not dominated or codominated by *Achnatherum speciosum* (desert needlegrass). If present, this grass has very low cover. **A34**

A34a. This grassland alliance is dominated by *Sporobolus cryptandrus* (sand dropseed), often codominant with *Aristida purpurea var. longiseta* (Fendler's threeawn) or *Poa secunda* (Sandberg bluegrass). Stands occur on gentle lower slopes, river terraces and alluvial bars on hot, dry sites in the Columbia Basin and lower Snake and Clearwater rivers in Oregon and Washington and in the lowest elevations of Hells Canyon within the Blue Mountains in Idaho, and in the Bighorn Basin in Montana. ..... **.....A3977 Sporobolus cryptandrus - Aristida purpurea var. longiseta - Poa secunda Sandy Stream Terrace Grassland Alliance**

A34b. Vegetation is not dominated or codominated by *Sporobolus cryptandrus* (sand dropseed) and/or *Aristida purpurea var. longiseta* (Fendler's threeawn), or if present then stand does not occur on river terraces and alluvial bars the Columbia Basin and lower Snake and Clearwater rivers in Idaho, Oregon and Washington, or along the Bighorn River in the Bighorn Basin in Montana. **A35**

A35a. Grasslands characterized by a sparse to moderately dense graminoid layer dominated or codominated by *Achnatherum hymenoides* (Indian ricegrass), *Aristida purpurea var. longiseta* (Fendler's threeawn), *Muhlenbergia pungens* (sandhill muhly), and/or *Pseudoroegneria spicata* (bluebunch wheatgrass) often with *Poa secunda* (Sandberg bluegrass) present to codominate. Stands occur in the canyons and valleys of the northern Great Basin and in the Columbia Basin, southern and middle Rocky Mountains, Colorado Plateau, and adjacent ecoregions. **A36**

A35b. Grasslands dominated or codominated by *Aristida purpurea* (purple threeawn), *Bouteloua eriopoda* (black grama), *Bouteloua gracilis* (blue grama), *Hesperostipa comata* (needle-and-thread), *Pleuraphis jamesii* (James' galleta), or *Sporobolus airoides* (alkali sacaton) and/or *Sporobolus cryptandrus* (sand dropseed). **A37**

A36a. This grassland alliance is characterized by a sparse to moderately dense graminoid layer dominated or codominated by *Pseudoroegneria spicata* (bluebunch wheatgrass) and/or *Aristida purpurea var. longiseta* (Fendler's threeawn) often with *Poa secunda* (Sandberg bluegrass) present to codominate. *Pseudoroegneria spicata* (bluebunch wheatgrass) is sometimes absent or has low cover, and *Sporobolus cryptandrus* (sand dropseed) and *Opuntia polyacantha* (plains pricklypear) may be especially abundant on disturbed or harsh windswept sites. Stands occur in the canyons and valleys of the northern Great Basin and in the Columbia Basin. ..... **..... A3976 Pseudoroegneria spicata - Opuntia polyacantha Dry Canyon Slope Grassland Alliance**

A36b. This grassland alliance is dominated by a variety of grasses, the most frequently occurring being *Achnatherum hymenoides* (Indian ricegrass), *Muhlenbergia pungens* (sandhill muhly),

and *Pseudoroegneria spicata* (bluebunch wheatgrass), and occurs in the southern and middle Rocky Mountains and Colorado Plateau, into adjacent ecoregions..... **..... A1262 Achnatherum hymenoides - Pseudoroegneria spicata - Muhlenbergia pungens Grassland Alliance**

A37a. This grassland alliance is dominated or codominated by *Bouteloua eriopoda* (black grama), *Bouteloua gracilis* (blue grama), *Pleuraphis jamesii* (James' galleta), or *Sporobolus airoides* (alkali sacaton). It occurs in arid and semi-arid regions in the southwestern Great Plains, Colorado Plateau, southern Rocky Mountains, Great Basin, and northern Chihuahuan Desert. **..... A1287 Pleuraphis jamesii Grassland Alliance**

A37b. This grassland alliance is dominated or codominated by *Aristida purpurea* (purple threeawn), *Hesperostipa comata* (needle-and-thread), and/or *Sporobolus cryptandrus* (sand dropseed) often with *Bouteloua gracilis* (blue grama) present to codominant. Stands are found primarily from Wyoming Basins, Colorado Plateau and Great Basin ecoregions. ..... **..... A1270 Hesperostipa comata Grassland Alliance**

G310 Intermountain Semi-Desert Steppe & Shrubland

A38a. Vegetation is a shrubland and shrub steppe dominated by species of *Chrysothamnus* (rabbitbrush) or *Ericameria* (goldenbush). **A39**

A38b. Vegetation is a dwarf-shrubland, shrubland or shrub steppe dominated by other shrubs and dwarf-shrubs such as *Glossopetalon spinescens* (spiny greasebush), *Gutierrezia microcephala* threadleaf snakeweed), *Gutierrezia sarothrae* (broom snakeweed), *Krascheninnikovia lanata* (winterfat), and/or species of *Opuntia* (pricklypear) cacti.....**A43**

A39a. Vegetation is dominated by *Chrysothamnus albidus* (whiteflower rabbitbrush) or *Chrysothamnus viscidiflorus* (yellow rabbitbrush) shrubs. **A40**

A39b. Vegetation is dominated by *Ericameria nauseosa* (rubber rabbitbrush), *Ericameria parryi* (Parry's rabbitbrush) or *Ericameria teretifolia* (green rabbitbrush) shrubs. **A41**

A40a. This shrubland alliance has a sparse woody layer dominated by the microphyllous evergreen shrub *Chrysothamnus albidus* (whiteflower rabbitbrush) and occurs around seeps, saline meadows and flats, and around pluvial lakes in the Great Basin. ..... **..... A0834 Chrysothamnus albidus Shrubland Alliance**

A40b. This shrub steppe and shrubland alliance is characterized by a sparse to dense layer of *Chrysothamnus viscidiflorus* (yellow rabbitbrush) and sparse to dense layer of graminoids and is known from in the southern San Luis Valley of Colorado, the lower slopes of mountains in western Wyoming and northern Utah, and on mesas and high plateaus of the Colorado Plateau.**..... A3195 Chrysothamnus viscidiflorus Steppe & Shrubland Alliance**

A41a. This xeromorphic shrubland alliance is dominated by *Ericameria teretifolia* (green rabbitbrush) and occurs from southern California mountains and valleys to the Mojave Desert, north into the southeastern Great Basin. ..... **..... A2540 Ericameria teretifolia Shrubland Alliance**

A41b. Vegetation not dominated by *Ericameria teretifolia* (green rabbitbrush). **A42**

A42a. This shrub steppe and shrubland alliance has an open to closed shrub layer dominated by *Ericameria nauseosa* (rubber rabbitbrush) and includes both natural and semi-natural stands from localized areas across the northern Great Plains and throughout the western U.S. ..... **..... A3196 Ericameria nauseosa Steppe & Shrubland Alliance**

A42b. This shrub steppe and shrubland alliance is characterized by having a sparse to dense shrub layer dominated by *Ericameria parryi* (Parry's rabbitbrush). It occurs in the Great Basin, Arizona-New Mexico Mountains, Colorado Plateau and in isolated locations in the northern Coast Ranges of California. **..... A3197 Ericameria parryi Shrubland Alliance**

A43a. This widespread alliance is characterized by a sparse to dense layer of *Krascheninnikovia lanata* (winterfat). **..... A3202 Krascheninnikovia lanata Steppe & Dwarf-shrubland Alliance**

A43b. Vegetation is not characterized by *Krascheninnikovia lanata* (winterfat) shrubs **A44**

A44a. This sparse shrubland alliance is dominated by the xeromorphic shrub *Glossopetalon spinescens* (spiny greasebush) and occurs along the rims of the Snake River and Imnaha River canyons in Idaho and eastern Oregon and likely elsewhere in the intermountain western US.. **..... A1032 Glossopetalon spinescens Shrubland Alliance**

A44b. Vegetation is not characterized by *Glossopetalon spinescens* (spiny greasebush).....**A45**

A45a. This alliance is dominated by clumps of various *Opuntia* (pricklypear) cacti and occurs in disturbed or extremely xeric sites with coarse soils throughout the Colorado Plateau and adjacent ecoregions. **..... A2650 Opuntia spp. Colorado Plateau Shrubland Alliance**

A45b. This alliance represents shrub and shrub herbaceous vegetation dominated by *Gutierrezia sarothrae* (broom snakeweed) or less frequently *Gutierrezia microcephala* threadleaf snakeweed) with a sparse to dense herbaceous layer composed of perennial graminoids. Stands occur of the Colorado Plateau and southern Rocky Mountains and in adjacent ecoregions**..... A3203 Gutierrezia sarothrae - Gutierrezia microcephala Dwarf-shrubland Alliance**

G296 Mojave Mid-Elevation Mixed Desert Scrub

A46a. Vegetation is wooded desert scrub dominated by *Juniperus californica* (California juniper) and/or characterized by *Yucca brevifolia* (Joshua tree) or *Yucca schidigera* (Mojave yucca). **A47**

A46b. Vegetation is not as above. **A49**

A47a. This wooded scrub alliance is dominated by *Juniperus californica* (California juniper) (>50% relative cover). Other trees present may include *Quercus turbinella* (Sonoran scrub oak), *Yucca brevifolia* (Joshua tree), *Pinus quadrifolia* (Parry pinyon), and *Pinus monophylla* (singleleaf pinyon). Stands of this wooded scrub alliance occur in southern California in the inner central Coast Ranges, the montane Transverse and Peninsular ranges, south and east through Baja California, Mexico, and the Mojave Desert. ..... **..... A0502 Juniperus californica Mojave Scrub Alliance**

A47b. Vegetation is not dominated by *Juniperus californica* (California juniper) (>50% relative cover). *Yucca brevifolia* (Joshua tree) or *Yucca schidigera* (Mojave yucca). **A48**

A48a. This wooded scrub alliance is characterized by an emergent (up to 13 m tall), open to moderately dense scrub tree layer characterized by *Yucca brevifolia* (Joshua tree) (>1% cover) with understory dominated by shrubs and/or a perennial graminoid-dominated layer. *Pinus monophylla* (singleleaf pinyon) and/or Juniperus *Juniperus* (juniper) spp. may be present with low cover (<50% relative cover). Stands are generally limited to the Mojave Desert, but may extend into the transition zone with the southern Great Basin. ..... **..... A3148 Yucca brevifolia Wooded Scrub Alliance**

A48b. This scrub alliance has a sparse, emergent layer of *Yucca schidigera* (Mojave yucca) with 3-5% total cover over a shrub canopy. It occurs throughout the Mojave and Colorado deserts, and southern Great Basin on alluvial fans, rocky slopes and upper bajadas. ..... **..... A3147 Yucca schidigera Scrub Alliance**

A49a. This xeromorphic upland scrub alliance occurs locally in the Mojave Desert and southern Great Basin and is characterized by an open, xeromorphic, short-shrub layer (0.5-2 m tall) that is dominated or codominated by *Menodora spinescens* (spiny menodora). Other shrubs and dwarf-shrubs are present.**..... A2515 Menodora spinescens Scrub Alliance**

A49b. Vegetation is not dominated or codominated by *Menodora spinescens* (spiny menodora). **A50**

A50a. This scrub alliance is characterized by an open shrub layer in which *Mortonia utahensis* (Utah mortonia) is dominant or codominant; other shrubs often present include *Echinocactus polycephalus* (cottontop cactus), *Echinocereus engelmannii* (Engelmann's hedgehog cactus), *Eriogonum heermannii* (Heermann's buckwheat), and *Gutierrezia sarothrae* (broom snakeweed). The alliance is currently known from desert areas of Nevada, California, and Arizona, where it is found primarily on skeletal rocky slopes of various aspects. ..... **..... A4158 Mortonia utahensis Scrub Alliance**

A50b. Vegetation is not dominated or codominated by *Mortonia utahensis* (Utah mortonia)...**A51**

A51a. This scrub alliance consists of shrublands dominated or codominated by *Purshia stansburiana* (Stansbury cliffrose). It occurs throughout the Intermountain West at middle elevations (800-2000 m) on edges of intermittent watercourses, canyons, hills, steep slopes, and cliffs. **..... A0833 Purshia stansburiana Scrub Alliance**

A51b. Vegetation not dominated or codominated by *Purshia stansburiana* (Stansbury cliffrose). **A52**

A52a. This scrub alliance is characterized by a sparse to open shrub layer of *Amphipappus fremontii* (Fremont's chaffbush) and/or *Salvia funerea* (woolly sage); other associated species include *Ambrosia dumosa* (burrobush), *Atriplex confertifolia* (shadscale saltbush), *Echinocactus polycephalus* (cottontop cactus), and *Lepidium fremontii* (desert pepperweed). The alliance is currently known from Death Valley National Monument in California where it occurs on alluvial fan toeslopes to summits on all aspects. ..... **..... A4159 Amphipappus fremontii - Salvia funerea Scrub Alliance**

A52b. Vegetation not dominated or codominated by *Amphipappus fremontii* (Fremont's chaffbush) and/or *Salvia funerea* (woolly sage). **A53**

A53a. This scrub alliance forms an open to intermittent shrub layer in which *Opuntia acanthocarpa* (buckhorn cholla) is a characteristic shrub and is dominant or codominant. The alliance is currently known from desert areas of California and Nevada, where it occurs on low to high slopes with east to southwest aspects. ..... **..... A4156 Opuntia acanthocarpa Scrub Alliance**

A53b. Vegetation is not dominated or codominated by *Opuntia acanthocarpa* (buckhorn cholla). **A54**

A54a. This scrub alliance is characterized by extremely xeromorphic evergreen stem succulents *Nolina bigelovii* (Bigelow's nolina), *Nolina parryi* (Parry's beargrass), or *Nolina microcarpa* (sacahuista) that forms an open canopy over a low-shrub layer. It is found in the Mojave Desert of California and southern Nevada, and extends into in Arizona. ..... **..... A3145 Nolina parryi - Nolina microcarpa Scrub Alliance**

A54b. Vegetation is not characterized by *Nolina parryi* (Parry's beargrass) or *Nolina microcarpa* (sacahuista). **A55**

A55a. This scrub alliance forms a sparse to open shrub layer of *Amphipappus fremontii* (Fremont's chaffbush) and/or *Salvia funerea* (woolly sage) with *Ambrosia dumosa* (burrobush), *Atriplex confertifolia* (shadscale saltbush), *Echinocactus polycephalus* (cottontop cactus), and *Lepidium fremontii* (desert pepperweed) often present. It is known from Death Valley National Monument in California occurring on toeslopes of alluvial fan to summits. ..... **..... A4159 Amphipappus fremontii - Salvia funerea Scrub Alliance**

A55b. Vegetation is not dominated or codominated by *Amphipappus fremontii* (Fremont's chaffbush) and/or *Salvia funerea* (woolly sage). **A56**

A56a. This scrub alliance has diagnostic presence of *Eriogonum wrightii* (bastardsage), *Eriogonum heermannii* (Heermann's buckwheat), and/or *Buddleja utahensis* (Utah butterflybush) with other associates *Eriogonum fasciculatum* (Eastern Mojave buckwheat) and *Prunus fasciculata* (desert almond). Found in desert areas in California and Arizona primarily on bedrock outcrops and high slopes, but may also occur on flats, ridgetops, and stony slopes on granitic, sedimentary, or serpentine substrates. ..... **..... A4167 Eriogonum wrightii - Eriogonum heermannii - Buddleja utahensis Scrub Alliance**

A56b. Vegetation lacks *Eriogonum wrightii* (bastardsage), *Eriogonum heermannii* (Heermann's buckwheat), and/or *Buddleja utahensis* (Utah butterflybush) in the shrub layer. **A57**

A57a. This Mojave Desert scrub alliance is characterized by a sparse to moderately dense shrub layer of *Coleogyne ramosissima* (blackbrush). Associates present to codominant may include *Ambrosia* (ragweed) spp., *Encelia resinifera* (sticky brittlebush), *Ephedra nevadensis* (Nevada joint-fir), *Menodora spinescens* (spiny menodora), *Grayia spinosa* (spiny hopsage), *Larrea tridentata* (creosotebush), *Purshia stansburiana* (Stansbury cliffrose), and *Thamnosma montana* (turpentinebroom). Included in this alliance are rock outcrop stands dominated by *Eriogonum fasciculatum* (Eastern Mojave buckwheat) sometimes with *Purshia glandulosa* (desert bitterbrush) codominant with *Viguiera parishii* (Parish's goldeneye) typically absent. Occasionally scattered (<2% cover) of *Yucca brevifolia* (Joshua tree), *Juniperus osteosperma* (Utah juniper), or *Pinus monophylla* (singleleaf pinyon) may be present. Stands range north into the southern Great Basin. ..... **..... A3144 Coleogyne ramosissima Mojave Desert Scrub Alliance**

A57b. Vegetation lacks *Coleogyne ramosissima* (blackbrush). If *Eriogonum fasciculatum* (Eastern Mojave buckwheat) is characteristic then *Viguiera parishii* (Parish's goldeneye) is present. **A58**

A58a. This low scrub alliance is dominated by *Viguiera parishii* (Parish's goldeneye) with *Eriogonum fasciculatum* (Eastern Mojave buckwheat) often present to codominant and

occupies wash and arroyo margins in gravel to boulder sized alluvium and moderate to steep colluvial slopes of the southwest deserts. ..... **..... A3150 Eriogonum fasciculatum - Viguiera parishii Desert Scrub Alliance**

A58b. Vegetation is not dominated by *Viguiera parishii* (Parish's goldeneye) or *Eriogonum fasciculatum* (Eastern Mojave buckwheat). **A59**

A59a. This sparse semi-desert scrub alliance is dominated by a short shrub layer of *Ephedra fasciculata* (Arizona joint-fir) often with an herbaceous layer consisting of mixed grasses. Stands occur in Grand Canyon National Park in Arizona and south into the Sonoran Desert. .... **..... A3139 Ephedra fasciculata Scrub Alliance**

A59b. Vegetation is not dominated by *Ephedra fasciculata* (Arizona joint-fir). **A60**

A60a. This scrub alliance forms an open to intermittent shrub layer dominated by *Ephedra funerea* (Death Valley joint-fir), often with *Ambrosia dumosa* (burrobush) and *Atriplex confertifolia* (shadscale saltbush) present. Currently known from the Mojave Desert in California on rocky slopes. **..... A4157 Ephedra funerea Scrub Alliance**

A60b. This scrub alliance has an open shrub layer is dominated by *Ephedra nevadensis* (Nevada joint-fir), *Lycium andersonii* (water jacket), or *Lycium cooperi* (peach thorn) with *Grayia spinosa* (spiny hopsage) often present to codominant. It occurs from the Great Basin and Colorado Plateau south to the Mojave and Sonoran deserts. ..... **..... A4245 Ephedra nevadensis - Lycium andersonii - Grayia spinosa Scrub Alliance**

G312 Colorado Plateau Blackbrush - Mormon-tea Shrubland

A61a. This Colorado Plateau shrubland alliance is characterized by a sparse to moderately dense shrub layer of *Coleogyne ramosissima* (blackbrush) sometime with other shrubs present to codominant such as *Ambrosia dumosa* (burrobush), *Artemisia filifolia* (sand sagebrush), *Atriplex canescens* (fourwing saltbush), *Atriplex confertifolia* (shadscale saltbush), *Chrysothamnus viscidiflorus* (yellow rabbitbrush), *Ephedra* (joint-fir) spp., *Ericameria* (rabbitbrush) spp., *Gutierrezia sarothrae* (broom snakeweed), *Krascheninnikovia lanata* (winterfat), *Lycium* (desert-thorn) spp., *Menodora spinescens* (spiny menodora), *Opuntia* (pricklypear) spp., *Purshia stansburiana* (Stansbury cliffrose), and *Quercus havardii var. tuckeri* (Havard oak). Total vegetation cover ranges from 5 to 70%. ..... **..... A3220 Coleogyne ramosissima Colorado Plateau Shrubland Alliance**

A61b. Vegetation is not characterized by *Coleogyne ramosissima* (blackbrush). **A62**

A62a. This Colorado Plateau shrubland alliance is characterized by patches of *Quercus havardii* (Havard oak) and is currently known from southeastern Utah but may extend into western Colorado. **..... A2654 Quercus havardii var. tuckeri Shrubland Alliance***

A62b. Vegetation is not characterized by patches of *Quercus havardii* (Havard oak). **A63**

A63a. This shrubland alliance is characterized by a sparse woody layer dominated by the xeromorphic evergreen shrub *Poliomintha incana* (frosted mint). It occurs on sandy sites in the Colorado Plateau in southeastern Utah and northern Arizona, to northern New Mexico in the southern Rocky Mountains. **..... A0862 Poliomintha incana Shrubland Alliance**

A63b. Vegetation is not characterized by *Poliomintha incana* (frosted mint). **A64**

A64a. This shrubland alliance is characterized by an open to moderately dense shrub layer dominated by *Artemisia filifolia* (sand sagebrush) on flat, hummocky, or rolling terrain, as well as on partially stabilized dunes and sandsheets. ..... **.....A3181 Artemisia filifolia Colorado Plateau Shrubland Alliance**

A64b. Vegetation is not dominated by *Artemisia filifolia* (sand sagebrush) although it may be present to codominant. **A65**

A65a. This low shrubland alliance is dominated by *Ephedra cutleri* (Cutler's joint-fir) and occurs in the Colorado Plateau. **..... A2644 Ephedra cutleri Shrubland Alliance**

A65b. Vegetation is not dominated by *Ephedra cutleri* (Cutler's joint-fir). **A66**

A66a. This shrubland alliance is dominated by *Ephedra viridis* (mormon-tea) and occurs in the Colorado Plateau. **..... A3201 Ephedra viridis Colorado Plateau Shrubland Alliance**

A66b. This shrubland alliance is characterized by an open canopy dominated or codominated by *Ephedra torreyana* (Torrey's joint-fir). Stands occur from the Colorado Plateau region of eastern Utah and northern Arizona. **..... A2572 Ephedra torreyana Shrubland Alliance**

G304 Intermountain Mountain Big Sagebrush Steppe & Shrubland

A67a. Vegetation is dominated or codominated by *Artemisia tridentata* (big sagebrush) **A68**
A67b. Vegetation is dominated by other species of *Artemisia* (sagebrush) **A69**

A68a. This steppe and shrubland alliance is characterized by a moderate to dense shrub layer dominated by *Artemisia tridentata ssp. vaseyana* (mountain big sagebrush) or *Artemisia tridentata ssp. spiciformis* (spiked big sagebrush). If other shrubs are present, they have low cover and do not codominate. Stands form large, continuous stands on mid-elevation mountain slopes and foothills, and as patches within montane or subalpine coniferous forests in mountainous areas across the western U.S. .....
.. A3207 Artemisia tridentata ssp. spiciformis - Artemisia tridentata ssp. vaseyana Steppe & Shrubland Alliance

A68b. This steppe and shrubland alliance is characterized by a moderate to dense shrub layer in which *Artemisia tridentata ssp. vaseyana* (mountain big sagebrush) is codominant with non-sagebrush shrub species *Amelanchier utahensis* (Utah serviceberry), *Holodiscus dumosus* (rockspirea), *Purshia tridentata* (antelope bitterbrush), or *Symphoricarpos oreophilus* (mountain snowberry). Perennial graminoids typically dominate the open to moderately dense herbaceous layer. This alliance forms large, continuous stands on mid-elevation mountain slopes and foothills, and can extend above the lower treeline patches within montane or subalpine coniferous forests across the western U.S.....
..... A3208 Artemisia tridentata ssp. vaseyana - Mixed Steppe & Shrubland Alliance

A69a. This shrubland alliance is heavily dominated by dwarf-shrub *Artemisia rothrockii* (timberline sagebrush). The only shrubs which co-occur are *Symphoricarpos rotundifolius* (roundleaf snowberry), *Ribes montigenum* (gooseberry currant), and *Holodiscus discolor* (oceanspray). Graminoids dominate the open herbaceous layer. Stands occur on slopes and ridges in the subalpine regions of California. **. A1098 Artemisia rothrockii Shrubland Alliance**

A69b. This steppe and shrubland alliance is characterized by an open to closed, medium-tall shrub canopy of *Artemisia cana ssp. viscidula* (mountain silver sagebrush) or *Artemisia cana ssp. bolanderi* (Bolander's silver sagebrush) with dry graminoids in the understory. Stands occur throughout the northern half of the Intermountain West in relatively moist environments, including mesic alkaline or saline basins, but not wetland or riparian sites (see riparian and wetland Key).....
A3200 Artemisia cana ssp. bolanderi - Artemisia cana ssp. viscidula Steppe & Shrubland Alliance

G303 Intermountain Dry Tall Sagebrush Steppe & Shrubland

A70a. This dry steppe and shrubland alliance is dominated by *Artemisia tridentata ssp. tridentata* (basin big sagebrush) or *Artemisia tridentata ssp. xericensis* (foothill big sagebrush). Other shrubs have low cover, except species that increase with disturbance such as *Gutierrezia sarothrae* (broom snakeweed), *Chrysothamnus viscidiflorus* (yellow rabbitbrush), and *Ericameria nauseosa* (rubber rabbitbrush). The understory, if present, is characterized by dry-site grass species.....
A3194 Artemisia tridentata ssp. tridentata - Artemisia tridentata ssp. xericensis Dry Steppe & Shrubland Alliance

A70b. Vegetation is not dominated by *Artemisia tridentata ssp. tridentata* (basin big sagebrush) or *Artemisia tridentata ssp. xericensis* (big sagebrush). **A71**

A71a. This dry steppe and shrubland alliance is dominated by *Artemisia tridentata ssp. wyomingensis* (Wyoming big sagebrush). Other shrubs have low cover, except species that increase with disturbance such as *Gutierrezia sarothrae* (broom snakeweed), *Chrysothamnus viscidiflorus* (yellow rabbitbrush), and *Ericameria nauseosa* (rubber rabbitbrush). This understory is a sparse to moderately dense herbaceous layer characterized by dry-site perennial graminoids such as *Achnatherum hymenoides* (Indian ricegrass), *Bouteloua gracilis* (blue grama), *Carex filifolia* (threadleaf sedge), *Distichlis spicata* (saltgrass), *Elymus elymoides* (squirreltail), *Hesperostipa comata* (needle-and-thread), *Pleuraphis jamesii* (James' galleta), and *Poa fendleriana* (muttongrass). Stands occur in the western United States on dry steppes with core distribution in the Great Basin, Colorado Plateau and Wyoming. .....
..... A3184 Artemisia tridentata ssp. wyomingensis Dry Steppe & Shrubland Alliance

A71b. This dry steppe and shrubland alliance has a mixed shrub canopy codominated by *Artemisia tridentata* (big sagebrush) with dry-site shrub species such as *Atriplex canescens* (fourwing saltbush), *Atriplex confertifolia* (shadscale saltbush), *Ephedra fasciculata* (Arizona joint-fir), *Ephedra viridis* (mormon-tea), *Ephedra nevadensis* (Nevada joint-fir), *Grayia spinosa*

(spiny hopsage), *Sarcobatus vermiculatus* (greasewood), or *Tetradymia canescens* (spineless horsebrush) present to codominant. The sparse to moderately dense herbaceous layer is dominated by dry-site perennial graminoids and diverse forbs. ..... **..... A3198 Artemisia tridentata - Mixed Shrub Dry Steppe & Shrubland Alliance**

G302 Intermountain Mesic Tall Sagebrush Steppe & Shrubland

A72a. This mesic steppe and shrubland alliance is characterized by an open to moderately dense short-shrub layer dominated or codominated by *Purshia tridentata* (antelope bitterbrush) with *Artemisia tridentata* (big sagebrush) and sometimes *Prunus virginiana* (chokecherry) present to codominant. The understory is sparse to dense and typically dominated by perennial bunchgrasses such as *Achnatherum hymenoides* (Indian ricegrass), *Achnatherum nelsonii* (Columbia needlegrass), *Achnatherum occidentale* (western needlegrass), *Festuca campestris* (rough fescue), *Festuca idahoensis* (Idaho fescue), *Hesperostipa comata* (needle-and-thread), *Leymus cinereus* (basin wildrye), *Poa secunda* (Sandberg bluegrass), and *Pseudoroegneria spicata* (bluebunch wheatgrass)..... **..... A3179 Purshia tridentata - Artemisia tridentata Mesic Steppe & Shrubland Alliance**

A72b. Vegetation is not characterized by an open to moderately dense short-shrub layer dominated or codominated by *Purshia tridentata* (antelope bitterbrush).....**A73**

A73a. This mesic steppe and shrubland alliance is characterized by an open to moderately dense shrub layer dominated or codominated by *Artemisia tripartita* (threetip sagebrush) with 10-25% cover, often with herbaceous species having equal or greater coverage than shrubs. Stands are distributed from the Columbia Basin east to the northern Rocky Mountains. ..... **..A1528 Artemisia tripartita ssp. tripartita - Artemisia tridentata Mesic Steppe & Shrubland Alliance**

A73b. Vegetation is not characterized by an open to moderately dense shrub layer dominated or codominated by *Artemisia tripartita* (threetip sagebrush). **A74**

A74a. This widespread mesic steppe and shrubland alliance is characterized by an open to dense shrub layer dominated (or codominated with at least 40% relative cover (in mixed stands) by *Artemisia tridentata ssp. wyomingensis* (Wyoming big sagebrush). Common associates include *Atriplex confertifolia* (shadscale saltbush), *Artemisia frigida* (prairie sagewort), *Krascheninnikovia lanata* (winterfat), *Purshia tridentata* (antelope bitterbrush), and *Symphoricarpos longiflorus* (desert snowberry). The sparse to dense herbaceous layer dominated by dry-mesic perennial bunchgrasses, especially *Festuca idahoensis* (Idaho fescue), *Hesperostipa comata* (needle-and-thread), *Pascopyrum smithii* (western wheatgrass), and *Pseudoroegneria spicata* (bluebunch wheatgrass). ..... **..... A3182 Artemisia tridentata ssp. wyomingensis Mesic Steppe & Shrubland Alliance**

A74b. This widespread mesic steppe and shrubland alliance is characterized by an open to moderately dense shrub layer of *Artemisia tridentata ssp. tridentata* (basin big sagebrush) or *Artemisia tridentata ssp. xericensis* (big sagebrush) with a sparse to dense herbaceous layer dominated by dry-mesic perennial bunchgrasses, especially *Elymus lanceolatus* (thickspike wheatgrass), *Festuca idahoensis* (Idaho fescue), *Hesperostipa comata* (needle-and-thread), *Leymus cinereus* (basin wildrye), *Pascopyrum smithii* (western wheatgrass), and *Pseudoroegneria spicata* (bluebunch wheatgrass). It occurs on sloping fans, footslopes, rolling hills, and especially deep, well-drained alluvial bottomlands with vegetation ..... **..... A3183 Artemisia tridentata ssp. tridentata - Artemisia tridentata ssp. xericensis Mesic Steppe & Shrubland Alliance**

G308 Intermountain Low & Black Sagebrush Steppe & Shrubland

A75a. Vegetation dominated or codominated by varieties of *Artemisia arbuscula* (little sagebrush) **A76**

A75b. Vegetation dominated by *Artemisia bigelovii* (Bigelow sage), *Artemisia nova* (black sagebrush), and/or *Artemisia frigida* (prairie sagewort).....**A79**

A76a. This steppe and shrubland alliance is dominated by *Artemisia arbuscula ssp. arbuscula* (little sagebrush) often in association with *Artemisia tridentata* (big sagebrush). This widespread alliance is known from cold, dry areas of the Intermountain West, as well as in dry alpine and subalpine habitats of the Sierra Nevada. ..... **..... A3219 Artemisia arbuscula ssp. arbuscula Steppe & Shrubland Alliance**

A76b. Vegetation not dominated by *Artemisia arbuscula ssp. arbuscula* (little sagebrush).....**A77**

A77a. This shrubland alliance is dominated by a low-shrub layer of *Artemisia arbuscula ssp. longicaulis* Lahontan sagebrush) and is known from cold, dry areas of the Intermountain West, in and around the Lahontan Basin of northwestern Nevada, southeastern Oregon, and northeastern California. **..... A2548 Artemisia arbuscula ssp. longicaulis Shrubland Alliance**

A77b. Vegetation is not dominated by *Artemisia arbuscula ssp. longicaulis* (Lahontan sagebrush). **A78**

A78a. This steppe and shrubland alliance is dominated or codominated by *Artemisia arbuscula ssp. thermopola* (Thermopola little sagebrush), *Artemisia papposa* (Owyhee sage), and/or Artemisia tripartita ssp. rupicola (Wyoming threetip sagebrush) in the shrub canopy and is widespread in the Intermountain West, the southern Rocky Mountains, and in the western Great Plains..... **..... A4122 Artemisia arbuscula ssp. thermopola - Artemisia papposa / Festuca idahoensis Steppe & Shrubland Alliance**

A78b. This steppe and shrubland alliance is dominated by *Artemisia arbuscula ssp. longiloba* (alkali sagebrush) in the shrub canopy and is widespread in the Intermountain West, the southern Rocky Mountains, and in the western Great Plains. ..... **.....A3221 Artemisia arbuscula ssp. longiloba Steppe & Shrubland Alliance**

A79a. This steppe and shrubland alliance is dominated or dominated by *Artemisia nova* (black sagebrush) and occurs at intermediate elevations (1400-2500 m) in the Intermountain West and Rocky Mountains. **.....A3222 Artemisia nova Steppe & Shrubland Alliance**

A79b. Vegetation is not dominated or codominated by *Artemisia nova* (black sagebrush). **A80**

A80a. This steppe and shrubland alliance is dominated by *Artemisia bigelovii* (Bigelow sage) and occurs in southern and central New Mexico, the Colorado Plateau near canyon rims, and southern Great Plains along escarpments..... **..... A3223 Artemisia bigelovii Steppe & Shrubland Alliance**

A80b. This alliance is dominated by the dwarf-shrub *Artemisia frigida* (prairie sagewort) and is described from the Colorado Plateau and western slope of the southern Rocky Mountains. .... **..... A2565 Artemisia frigida Dwarf-shrubland Alliance**

G307 Columbia Plateau Scabland Dwarf-shrubland

A81a. Vegetation is dominated by one of several species of *Eriogonum* (buckwheat) dwarf-shrubs. *Artemisia rigida* (scabland sagebrush) and *Salvia dorrii* (purple sage) is typically absent. **A82**

A81b. Vegetation is dominated by *Artemisia rigida* (scabland sagebrush) or *Salvia dorrii* (purple sage). *Eriogonum* (buckwheat) species may codominate. **A83**

A82a. This minor dwarf-shrubland alliance is dominated by dwarf-shrub *Eriogonum microthecum* (slender buckwheat) and occurs in portions of the Snake and Imnaha river canyons in Idaho and eastern Oregon and Washington. *Eriogonum microthecum* (slender buckwheat) occurs widely in the interior Western US so this alliance may occur more widely. ..... **..... A1107 Eriogonum microthecum Dwarf-shrubland Alliance**

A82b. This dwarf-shrub steppe alliance is characterized by one or more *Eriogonum* (buckwheat) dwarf-shrub species including *Eriogonum compositum* (arrowleaf buckwheat), *Eriogonum douglasii* (Douglas' buckwheat), *Eriogonum niveum* (snow buckwheat), *Eriogonum sphaerocephalum* (rock buckwheat), *Eriogonum strictum* (Blue Mountain buckwheat), and *Eriogonum thymoides* (thymeleaf buckwheat). Stands occur in the Columbia Basin of eastern Washington, eastern Oregon, Idaho and western Wyoming. ..... **..... A1568 Eriogonum spp. / Poa secunda Dwarf-shrub Steppe Alliance***

A83a. This steppe and shrubland alliance is characterized by a woody layer of scattered *Artemisia rigida* (scabland sagebrush) and occurs in scablands east of the Cascade Range in the Columbia Basin steppe and on the Snake River plateau of Oregon, Washington and Idaho. ..... **..... A1574 Artemisia rigida Steppe & Shrubland Alliance***

A83b. This dwarf-shrub steppe alliance is characterized by the dominance of where *Salvia dorrii* (purple sage) is the dwarf-shrub layer. Stands occur in Oregon in the High Lava Plains, and the southern canyonlands of the Columbia Basin and at isolated spots throughout the Blue Mountains..... **A1129 Salvia dorrii Dwarf-shrubland Alliance***

6.B.1 Temperate & Boreal Cliff, Scree & Other Rock Vegetation

D052 Western North American Temperate & Boreal Cliff, Scree & Rock Vegetation

M1a. This temperate and boreal sparsely vegetated rock outcrop and cliff face macrogroup is characterized by 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% cover. Stands occur in the Coast Mountains of British Columbia to northwestern Oregon. **G2**
..... M887 Western North American Cliff, Scree & Rock Vegetation

M1b. There is only one macrogroup in this division. There is an analogous macrogroup for the eastern North America.

M887 Western North American Cliff, Scree & Rock Vegetation

G2a. This group consists of dry barren and sparsely vegetated rock outcrops and cliff faces of the Rocky Mountains and higher elevation plateaus and ranges in the interior western US , and Cascade Range where there is often very high cover of nonvascular lichens and, in wetter places, mosses. Characteristic trees include species from the surrounding landscape, such as *Pseudotsuga menziesii* (Douglas-fir), *Pinus ponderosa* (ponderosa pine), *Pinus flexilis* (limber pine), *Populus tremuloides* (quaking aspen), *Abies concolor* (white fir), *Abies lasiocarpa* (subalpine fir), or *Pinus edulis* (two-needle pinyon) and *Juniperus* (juniper) spp. at lower elevations. There may be scattered shrubs present, such as species of *Holodiscus* (oceanspray), *Ribes* (currant), *Physocarpus* (ninebark), *Rosa* (rose), *Juniperus* (juniper), and *Jamesia americana* (fivepetal cliffbush), *Mahonia repens* (creeping barberry), *Rhus trilobata* (skunkbush sumac), or *Amelanchier alnifolia* (Saskatoon serviceberry). **A3**
..... G565 Rocky Mountain Cliff, Scree & Rock Vegetation

G2b. This group consists of dry barren and sparsely vegetated rock outcrops and cliff faces from elsewhere in Western North America including Californian, Southern Vancouverian, Northern Vancouverian, Western Boreal provinces **..... G563 Californian Cliff, Scree & Rock Vegetation***
..... G573 Southern Vancouverian Cliff, Scree & Rock Vegetation*
..... G318 North Vancouverian Montane Bedrock, Cliff & Talus Vegetation*
..... G822 Western North American Boreal Cliff & Rock Vegetation*

G565 Rocky Mountain Cliff, Scree & Rock Vegetation

A3a. These wooded scree communities are characterized by *Picea engelmannii* (Engelmann spruce) as the dominant mature tree species and occur on steep slopes of any exposure in the southern Rocky Mountains of southern Colorado and northern New Mexico.....
..... A0556 Picea engelmannii Rock Alliance

A3b. Vegetation is not as above. *Picea engelmannii* (Engelmann spruce) is typically absent.....**A4**

A4a. Sparsely vegetated areas dominated by various forbs and graminoids occupying cliffs, outcrops and scree areas of the Colorado and Wyoming Rocky Mountains in subalpine to alpine settings. Characteristic shrubs may include *Artemisia frigida* (prairie sagewort), *Chrysothamnus viscidiflorus* (yellow rabbitbrush), *Holodiscus dumosus* (rockspirea), *Purshia tridentata* (antelope bitterbrush), *Rhus trilobata* (skunkbush sumac), and *Ribes cereum* (wax currant). The most consistent dominant herbaceous species include *Aletes anisatus* (Rocky Mountain Indian parsley), *Aquilegia caerulea* (Colorado blue columbine), *Cirsium scopulorum* (mountain thistle), *Claytonia megarhiza* (alpine springbeauty), *Heuchera bracteata* (bracted alumroot), *Heuchera parvifolia* (littleleaf alumroot), and *Scutellaria brittonii* (Britton's skullcap). Elevations range from 1800 to >3900 m. .....
.....**A3740 Aletes anisatus - Holodiscus dumosus - Rubus idaeus Cliff, Scree & Rock Alliance**

A4b. Vegetation is not as above. **A5**

A5a. Sparse cliff, scree and rock outcrop vegetation of the northern Rocky Mountains. The most common dominants include *Aquilegia flavescens* (yellow columbine), *Penstemon ellipticus* (rocky ledge penstemon), *Phacelia hastata* (silverleaf phacelia) and *Senecio megacephalus* (rocky ragwort).**.... A3741 Aquilegia flavescens - Phacelia hastata Cliff, Scree & Rock Alliance**

A5b. Seepage areas along vertical rockfaces, vertical to sloped rockwalls at the base of waterfalls, and large rocks and boulders kept wet by spray from nearby turbulent waterflow (e.g., cascading streamflow or churning of plunge pools at the base of waterfalls). They have a water regime ranging from seasonally to perennially wet but a minimum duration of wetness is needed to maintain these communities. This alliance is found in montane to alpine regions of the Rocky Mountain cordillera, from southern New Mexico north into Montana, Idaho,

northeast Washington, Alberta and British Columbia, and west into the lower elevations and mountain ranges within the Intermountain West region. **..... ..... A4146 Sullivantia hapemanii - Mimulus spp. Wet Rock Alliance**

Key to USNVC Wetland and Riparian Macrogroups, Groups and Alliances in the Central Basin and Range Ecoregion in the Western US

1.B.3 Temperate Flooded & Swamp Forest

D195 Rocky Mountain-Great Basin Montane Flooded & Swamp Forest

M1a. Montane riparian and swamp forests and woodlands dominated by cottonwoods, conifers, or a mix with such species as *Acer negundo* (box-elder), *Alnus rhombifolia* (white alder), *Picea engelmannii* (Engelmann spruce), *Picea pungens* (blue spruce), *Pinus contorta* (lodgepole pine), *Pinus ponderosa* (ponderosa pine), *Populus angustifolia* (narrowleaf cottonwood), *Populus balsamifera* (balsam poplar), or *Thuja plicata* (western red-cedar). Throughout the Great Basin and Rocky Mountains. **G2**
..... M034 Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

M1b. There is only one macrogroup within this division. **G2**

M034 Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

G2a. Conifer dominated wetland group; *Thuja plicata* (western red-cedar) and/or *Picea engelmannii* (Engelmann spruce) with an obligate wetland herbaceous understory such as *Lysichiton americanus* (American skunkcabbage). Very poorly drained soils that are saturated year-round or may have seasonal flooding in the spring. Northern Rocky Mountains; northwestern Wyoming into the Canadian Rockies; eastern Oregon and Washington. **A3**
..... G505 Rocky Mountain-Great Basin Swamp Forest

G2b. Seasonally flooded conifer- or broadleaf-dominated forests, montane to subalpine elevations; *Picea engelmannii* (Engelmann spruce), *Picea pungens* (blue spruce), and/or *Populus angustifolia* (narrowleaf cottonwood), occasionally *Populus tremuloides* (quaking aspen). Understory dominated by forbs or graminoids with few shrubs. Soils are mineral and very well-oxygenated. Rocky Mountain cordillera, southern New Mexico into Montana, Intermountain West region and the Colorado Plateau. **A4**
..... G506 Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

G505 Rocky Mountain-Great Basin Swamp Forest

A3a. Seasonally flooded conifer-dominated forests; species such as *Thuja plicata* (western red-cedar) and/or *Tsuga heterophylla* (western hemlock). Other trees may include *Pseudotsuga menziesii* (Douglas-fir), *Abies grandis* (grand fir), and *Abies lasiocarpa* (subalpine fir). Riparian areas and toeslopes saturated throughout the growing season. Marine-influenced interior mountains of northeastern Washington, northern Idaho, southeastern British Columbia and northwestern Montana west of the Continental Divide. .....
..... A3776 Thuja plicata - Tsuga heterophylla Rocky Mountain Swamp Forest Alliance

A3b. Riparian wetlands dominated by *Picea engelmannii* (Engelmann spruce), *Picea glauca* (white spruce), and their hybrids. *Betula papyrifera* (paper birch) is occasionally present. Montana, Wyoming and Idaho. **..... A3775 Picea engelmannii Swamp Forest Alliance**

G506 Rocky Mountain-Great Basin Montane Riparian & Swamp Forest

A4a. Dominated by deciduous trees such as narrowleaf cottonwoods (*Populus angustifolia*), aspen (*Populus tremuloides*), and/or Box elder (*Acer negundo*).....**A5**

A4b. Stands dominated by conifers **A7**

A5a. Riparian and swamp woodlands dominated by *Acer negundo* (Box elder), *Alnus* spp. (alder) and/or *Cornus sericea* (red Osier dogwood). .....
..... A4154 Acer negundo - Alnus incana ssp. tenuifolia - Cornus sericea Riparian Woodland Alliance

A5b. Riparian forests dominated by *Populus angustifolia* (narrowleaf cottonwood) and/or *Populus tremuloides* (quaking aspen). Widely distributed, Rocky Mountains from Alberta south to New Mexico, Great Basin ranges and in the Sierra Nevada.....**A6**

A6a. Riparian woodlands dominated by *Populus angustifolia* (narrowleaf cottonwood) alone or mixed with other trees. Narrow stream terraces and large floodplains. .....
..... A3759 Populus angustifolia Riparian Forest Alliance

A6b. Stands of *Populus tremuloides* (quaking aspen) that are truly wetlands or riparian; sometimes other trees are codominant, such as *Populus angustifolia* (narrowleaf cottonwood), *Abies concolor* (white fir), *Pinus ponderosa* (ponderosa pine), and *Picea pungens* (blue spruce). Open stands with a shrub layer of wet-site indicators such as *Alnus*

incana (gray alder), *Cornus sericea* (red-osier dogwood), and *Salix* (willow) spp. Riparian zones or sometimes near lakes where the ground is flooded or saturated in the spring. ..... **..... A3760 Populus tremuloides Riparian Forest Alliance**

A7a. Riparian woodlands or forests dominated by *Pinus contorta* (lodgepole pine) or *Abies grandis* (grand fir). Usually with other conifers such as *Abies lasiocarpa* (subalpine fir), *Larix occidentalis* (western larch), *Pinus monticola* (western white pine), *Pseudotsuga menziesii* (Douglas-fir), *Abies x shastensis* (Shasta red fir), *Picea engelmannii* (Engelmann spruce), *Pinus flexilis* (limber pine), or *Tsuga mertensiana* (mountain hemlock). **A8**

A7b. Riparian woodland or forests dominated by *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce), *Picea pungens* (blue spruce), *Pinus ponderosa* (ponderosa pine), *Juniperus scopulorum* (Rocky Mountain juniper), and/or *Abies concolor* (white fir). ...**A9**

A8a. Riparian woodland alliance characterized by *Pinus contorta* (lodgepole pine). Associated conifers may include *Abies grandis* (grand fir), *Abies lasiocarpa* (subalpine fir), *Abies x shastensis* (Shasta red fir), *Picea engelmannii* (Engelmann spruce), *Pinus flexilis* (limber pine), or *Tsuga mertensiana* (mountain hemlock). Upper montane riparian or wetland areas; flat, wet, relatively cold sites such as margins of meadows, lake or forest basins, and along valley bottoms in the Rocky Mountains and Sierra Nevada. ..... **. A3758 Pinus contorta var. murrayana - Pinus contorta var. latifolia Swamp Forest Alliance**

A8b. Riparian areas dominated by *Abies grandis* (grand fir), usually with other conifers. *Abies lasiocarpa* (subalpine fir), *Larix occidentalis* (western larch), *Pinus monticola* (western white pine), and *Pseudotsuga menziesii* (Douglas-fir) may be present. *Betula papyrifera* (paper birch) or *Populus balsamifera ssp. trichocarpa* (black cottonwood) may form a scattered subcanopy. Benches, toeslopes or valley bottoms along mountain streams in the Rocky Mountains of western Montana, Idaho and eastern Washington and eastern Oregon, possibly extending into British Columbia. ..... **..... A3762 Abies grandis Rocky Mountain Riparian Forest Alliance**

A9a. Subalpine riparian or seep slope conifer forests; characterized by *Abies lasiocarpa* (subalpine fir) and *Picea engelmannii* (Engelmann spruce). Other conifer species may include *Picea engelmannii x glauca*, *Picea glauca* (white spruce), *Pinus contorta* (lodgepole pine), and *Tsuga mertensiana* (mountain hemlock). Found in landscape positions where snowmelt moisture creates shallow water tables, seeps, or streamside flooding during much of the growing season.**..... A3757 Abies lasiocarpa - Picea engelmannii Swamp Forest Alliance**

A9b. Lower elevation riparian areas, not like above in all respects **A10**

A10a. Riparian areas with a dominance of *Picea pungens* (blue spruce). Common associates include *Abies concolor* (white fir), *Abies lasiocarpa* (subalpine fir), *Picea engelmannii* (Engelmann spruce), *Pinus contorta* (lodgepole pine), *Pinus ponderosa* (ponderosa pine), and *Pseudotsuga menziesii* (Douglas-fir) (which may replace *Picea pungens* (blue spruce)). *Populus angustifolia* (narrowleaf cottonwood) or *Populus tremuloides* (quaking aspen) can be common. Middle elevations of the central and southern Rocky Mountains and Colorado Plateau. Narrow or V-shaped valleys and canyons subject to cold-air drainage and limited sunlight. They occupy streambanks, terraces, narrow floodplains or benches, and subirrigated toeslopes; stream gradients are often steep. ..... **..... A3761 Picea pungens Riparian Forest Alliance**

A10b. Conifer-dominated, low-elevation riparian areas characterized by *Pinus ponderosa* (ponderosa pine), *Juniperus scopulorum* (Rocky Mountain juniper), and/or *Abies concolor* (white fir). Can occur as broad, extensive stands on wider floodplain terraces or as narrow, long ribbons. Found throughout the Rocky Mountains, south into Arizona and New Mexico, and west into eastern mountain valleys of Washington and Oregon. ..... **..... A3797 Pinus ponderosa - Juniperus scopulorum - Abies concolor Riparian Woodland Alliance**

D013 Western North American Interior Flooded Forest

M1a. Macrogroup of low-elevation riparian and lacustrine areas of western U.S. and into Mexico; dominated by non-native invasive woody species such as *Tamarix* (tamarisk) spp., *Elaeagnus angustifolia* (Russian olive), *Phoenix dactylifera* (date palm), *Salix alba* (white willow) and/ or *Salix fragilis* (crack willow). Includes stands dominated by native tree species such as *Acer negundo (box elder) and Populus* spp. (cottonwood), with understories of non-native species. **G2**
..... M298 Interior West Ruderal Flooded & Swamp Forest & Woodland

M1b. Riparian and wetland forested vegetation of lowlands of southwestern U.S., Mediterranean California and Tamaulipan area of southern Texas. Dominant tree species include *Acacia farnesiana* (sweet acacia), *Celtis laevigata var. reticulata* (netleaf hackberry), *Ebenopsis ebano* (Texas ebony), *Juglans major* (Arizona walnut), *Platanus wrightii* (Arizona sycamore), *Populus deltoides ssp. wislizeni* (Rio Grande cottonwood), *Populus deltoides ssp. monilifera* (eastern cottonwood), *Populus fremontii* (Fremont cottonwood), *Platanus racemosa* (California sycamore), *Prosopis velutina* (velvet mesquite), *Salix gooddingii* (Goodding's willow), and *Salix laevigata* (red willow). Also includes oases dominated by evergreen palms *Washingtonia filifera* (California fan palm) or *Sabal mexicana* (Rio Grande palmetto). **G3**
..... M036 Interior Warm & Cool Desert Riparian Forest

M298 Interior West Ruderal Flooded & Swamp Forest & Woodland

G2a. Dominated by non-native invasive woody species such as *Tamarix* (tamarisk) spp., *Elaeagnus angustifolia* (Russian olive), and others. There is only one group in this macrogroup. **A4**
..... G510 Interior West Ruderal Riparian Forest & Scrub

G2b. Riparian forests dominated by native species and is not like above in all respects.....**G3**

M036 Interior Warm & Cool Desert Riparian Forest

G3a. Riparian woodland group dominated by tree and tall arborescent shrubs such as *Acer negundo (box elder), Celtis laevigata var. reticulata* (netleaf hackberry), *Cephalanthus occidentalis* (common buttonbush), *Fraxinus velutina* (velvet ash), *Juglans major* (Arizona walnut), *Platanus wrightii* (Arizona sycamore), *Populus deltoides* (eastern cottonwood), *Populus fremontii* (Fremont cottonwood), *Platanus racemosa* (California sycamore), *Quercus lobata* (valley oak), *Salix gooddingii* (Goodding's willow), *Salix laevigata* (red willow), *Sapindus saponaria* (wingleaf soapberry), and *Washingtonia filifera* (California fan palm). **A9**
..... G797 Western Interior Riparian Forest & Woodland

G3b. Other groups in this macrogroup do not occur in the CBR key area. .....

G510 Interior West Ruderal Riparian Forest & Scrub

A4a. Stands dominated by *Tamarix* (tamarisk) and/or *Elaeagnus angustifolia* (Russian olive).....**A5**
A4b. Stands dominated by other species. **A6**

A5a. Dominated by introduced species of *Tamarix* (tamarisk), including *Tamarix chinensis* (five-stamen tamarisk), *Tamarix gallica* (French tamarisk), *Tamarix parviflora* (smallflower tamarisk), and *Tamarix ramosissima* (saltcedar). Moderately dense to dense thickets on banks of larger streams, rivers and playas across the southwestern U.S. and northern Mexico.
..... A0842 Tamarix spp. Ruderal Riparian Scrub Alliance

A5b. Alliance dominated by the introduced and naturalized tree species *Elaeagnus angustifolia* (Russian olive) with a variety of native and introduced species in the shrub and herbaceous layers. Widespread throughout much of the western United States; seeds are spread by birds. Occurs in a variety of mesic areas, such as near streams and rivers, upland basins and drainages. **..... A3566 Elaeagnus angustifolia Ruderal Riparian Scrub Alliance**

A6a. Stands dominated by *Acer negundo* (box elder), *Populus* spp. (cottonwood), *Picea* spp. (spruce species), or *Salix fragilis* (crack willow). **A7**
A6b. Stands dominated by other species. **A8**

A7a. Riparian forests dominated by *Acer negundo (box elder), Populus* spp. (cottonwood species) or *Picea* spp (spruce species), with non-native understory species such as *Tamarix* (tamarisk), *Bromus tectorum* (cheatgrass), or other introduced species, generally these have high cover. Ruderal type, can occur anywhere along riparian and low wet areas throughout the western US.**..... A4155 Acer negundo - Populus spp. - Picea spp. Ruderal Riparian Forest Alliance**

A7b. Naturalized stands of *Salix fragilis* (crack willow) and/or *Salix alba* (white willow) occurring along riverbanks and lakeside margins. Throughout the western U.S. and western Great Plains. **..... A4192 Salix alba - Salix fragilis Ruderal Riparian Forest Alliance**

A8a. Ruderal shrubland alliance; dominants include *Ficus carica* (edible fig), *Nerium oleander* (oleander), *Caragana arborescens* (Siberian peashrub), *Rubus armeniacus* (Himalayan blackberry), and/or *Sesbania punicea* (rattlebox). Includes planted stands of *Fraxinus velutina* (velvet ash), and *Tamarix aphylla* (Athel tamarisk). Rarely documented. ..... **.. A4160 Rubus armeniacus - Sesbania punicea - Ficus carica Ruderal Riparian Scrub Alliance**

A8b. Mesquite scrub with moderate to dense tall woody canopy dominated by *Prosopis glandulosa* (honey mesquite), *Prosopis pubescens* (screwbean mesquite), and/or *Prosopis velutina* (velvet mesquite). Other species are generally exotics such as *Tamarix* (tamarisk) and many non-native herbaceous species, replacing the native understory. Southwestern US from California to Texas and in Chihuahua and Coahuila, Mexico. Mesic areas such as floodplains, streambanks, intermittently flooded arroyo terraces, alkali sinks and washes, and dry terraces above streams and arroyos. ..... **.....A4218 Prosopis spp. Lowland Ruderal Understory Wet Scrub Alliance**

G797 Western Interior Riparian Forest & Woodland

A9a. Riparian woodlands dominated by *Populus* (cottonwood) species. **A10**
A9b. Riparian woodlands dominated by other woody species **A13**

A10a. Stands dominated by *Populus fremontii* (Fremont cottonwood), known from throughout CA, southern and central NV, northern and western Arizona, and western Utah.....**A11**
A10b. Stands not like above in all respects.....**A12**

A11a. Riparian woodlands in the cool deserts of the Great Basin dominated by *Populus fremontii* (Fremont cottonwood). Along stream channels on alluvial fans, in lower canyons in desert mountains, and valleys with annually variable but dependable subsurface groundwater. ..... **..... A0644 Populus fremontii Great Basin Riparian Forest Alliance**
A11b. Other alliances in this group do not occur in Central Basin and Range key area.

A12a. Woodland alliance dominated by *Populus deltoides ssp. wislizeni* (Rio Grande cottonwood), *Populus deltoides ssp. monilifera* (eastern cottonwood), or *Salix amygdaloides* (peachleaf willow). Other trees include *Acer negundo* (box elder). Alluvial floodplains, terraces and streambanks of rivers and streams, and sometimes around lakes and ponds; Wyoming, Colorado, New Mexico, and the Colorado Plateau of Utah. ..... **..... A3798 Populus deltoides ssp. wislizeni - Populus deltoides ssp. monilifera - Salix amygdaloides Riparian Woodland Alliance**
A12b. Stands not like above in all respects.....**A13**

A13a. Riparian woodland alliance dominated by *Acer negundo* (box elder), *Fraxinus anomala (singleleaf ash),* and/or *Celtis laevigata var. reticulata* (netleaf hackberry). Common associates include *Alnus incana* (gray alder), *Betula occidentalis* (water birch), *Brickellia* spp. (brickellbush), *Cornus sericea* (red-osier dogwood), *Quercus gambelii* (Gambel oak), *Rhus trilobata* (skunkbush sumac), and others. Intermittently dry streams or in slickrock canyons; Colorado Plateau and south into Arizona and New Mexico..... **..... A3796 Acer negundo - Fraxinus anomala - Celtis laevigata var. reticulata Riparian Woodland Alliance**
A13b. Stands not like above in all respects.....**A14**

A14a. Stands dominated by *Juglans* (walnut).....**A15**
A14b. Stands dominated by other species. **A16**

A15a. Riparian scrubland alliance dominated by *Juglans microcarpa* (little walnut). Intermittently to temporarily flooded low-elevation (below 1500 m) streambeds and stream margins in desert canyons and valleys of Texas. ..... **..... A0945 Juglans microcarpa Riparian Scrub Alliance**
A15b. Riparian wooded alliance where *Juglans major* (Arizona walnut) or *Juglans microcarpa* (little walnut) dominates the upper canopy. Other woody species *Acer negundo (box elder), Brickellia laciniata* (splitleaf brickellbush), *Celtis laevigata var. reticulata* (netleaf hackberry), *Chilopsis linearis* (desert willow), and *Fallugia paradoxa* (Apache plume). Perennial and intermittent streambanks and beds in the southwest, gentle gradient but very rocky reaches.

Southern Arizona and New Mexico and possibly adjacent areas in Mexico and southwestern Texas. **..... A0957 Juglans major - Juglans microcarpa Riparian Forest Alliance**

A16a. Riparian woodland alliance dominated by *Platanus wrightii* (Arizona sycamore). *Fraxinus velutina* (velvet ash) and *Juglans major* (Arizona walnut) are common associates. Perennial or seasonally intermittent streams in Arizona, southwestern New Mexico and northern Mexico. **.....A3801 Platanus wrightii Riparian Forest Alliance**

A16b. Riparian woodland alliance of California dominated by *Salix gooddingii* (Goodding's willow) and *Salix laevigata* (red willow), either as single-species stands or as mixed stands. Generally without *Populus fremontii* (Fremont cottonwood). ..... **..... A3752 Salix gooddingii - Salix laevigata Riparian Forest Alliance**

2.C.2 Temperate to Polar Bog & Fen

D029 North American Bog & Fen

M1a. Alkaline fens on peatlands across the boreal regions of North America, extending south into sub-boreal regions of the Rocky Mountains, Great Lakes, and northeastern and north-central U.S. *Sphagnum* (sphagnum) peatmoss and ericaceous shrubs are patchy to absent and brown mosses, broad-leaved non-ericaceous shrubs, and thin-leaved graminoids are common. **G2**
..... M877 North American Boreal & Sub-boreal Alkaline Fen

M1b. There is only one macrogroup within this division in the range of this key **G2**

M877 North American Boreal & Sub-boreal Alkaline Fen

G2a. Dominated by graminoids and low shrubs: *Carex buxbaumii* (Buxbaum's sedge), *Carex cusickii* (Cusick's sedge), *Carex limosa* (mud sedge), *Carex saxatilis* (rock sedge), *Carex utriculata* (Northwest Territory sedge), *Kobresia myosuroides* (Bellardi bog sedge), and *Kobresia simpliciuscula* (simple bog sedge). Shrubs include *Betula glandulosa* (resin birch), *Betula nana* (dwarf birch) and several *Salix* (willow) spp. Fens with groundwater discharge, soil chemistry (neutral to alkaline), and peat accumulation of at least 40 cm. Rocky Mountains from Colorado north into Canada. **A3**
..... G516 Rocky Mountain Alkaline Fen

G2b. Only one group within this Macrogroup **A3**

G516 Rocky Mountain Alkaline Fen

A3a. *Betula nana* (dwarf birch) is an indicator for the shrubby growth form on these fens; however, other shrub species may be dominant. There is usually herbaceous cover, and dense mosses cover the ground. Shrub-dominated neutral to alkaline pH fens (organic soil wetlands) found at elevations of 1500-3350 m (5000-11,000 feet) within the Rocky Mountains.**..... A3434 Betula nana Alkaline Shrub Fen Alliance**

A3b. Herbaceous dominated fens, not like above.....**A4**

A4a. Herbaceous fens dominated by one or more *Carex* (sedge) species. Some well-documented species include *Carex buxbaumii* (Buxbaum's sedge), *Carex cusickii* (Cusick's sedge), *Carex limosa* (mud sedge), and *Carex saxatilis* (rock sedge). *Carex aquatilis* (water sedge) and *Carex utriculata* (Northwest Territory sedge) may be present as well. Fens are seasonally or permanently saturated wetlands with an organic substrate that is at least 30 cm thick, and are neutral to alkaline.....
..... A3435 Carex limosa - Carex buxbaumii - Triglochin maritima Alkaline Graminoid Fen Alliance

A4b. Strongly alkaline fens characterized by herbaceous species *Kobresia myosuroides* (Bellardi bog sedge) and *Kobresia simpliciuscula* (simple bog sedge), the later indicating extremely rich conditions. The water chemistry is distinct in that it contains high levels of calcium and magnesium. Only known in the Rocky Mountains of Colorado, but likely to occur elsewhere in the Rocky Mountains into Canada.....
..... A3436 Kobresia myosuroides - Kobresia simpliciuscula Alkaline Graminoid Fen Alliance

2.C.4 Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland

D031 Western North American Temperate & Boreal Freshwater Marsh, Wet Meadow & Shrubland

M1a. Montane to alpine wet meadows, marshes and wet shrublands. Dominant graminoids such as *Calamagrostis canadensis* (bluejoint), *Carex scopulorum* (mountain sedge), *Carex utriculata* (Northwest Territory sedge), *Glyceria striata* (fowl mannagrass), forbs such as *Caltha leptosepala* (white marsh-marigold), *Dodecatheon jeffreyi* (Sierra shootingstar), *Sibbaldia procumbens* (creeping sibbaldia), and shrubs such as, but not limited to, *Alnus incana* (gray alder), *Betula occidentalis* (water birch), *Betula glandulosa* (resin birch), and many *Salix* (willow) species. Throughout the Rocky Mountains of the U.S. and Canada, the Sierra Nevada, and Intermountain cordillera. **G3**
..... M075 Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland

M1b. Wetlands not like above in all respects.....**M2**

M2a. Disturbed natural wetland habitats of temperate western U.S. that are strongly dominated by non-native and sometimes weedy or generalist native species. Non-native species may include *Agrostis gigantea* (redtop), *Agrostis stolonifera* (creeping bentgrass), *Alopecurus pratensis* (meadow foxtail), *Arundo donax* (giant reed), *Cirsium arvense* (Canada thistle), *Conyza canadensis* (Canadian horseweed), *Lolium arundinaceum* (tall fescue), *Lactuca serriola* (prickly lettuce), *Phalaris arundinacea* (reed canarygrass), *Phragmites australis* (common reed), *Poa palustris* (fowl bluegrass), *Poa pratensis* (Kentucky bluegrass), and *Sonchus* (sowthistle) spp. Native species may be present but are so low in abundance that they are insufficient to identify the native macrogroup or lower units. **G6**
..... M301 Western North American Ruderal Marsh, Wet Meadow & Shrubland

M2b. Freshwater marshes found at all elevations below alpine in the semi-arid interior basins and mountains of western U.S., with dominant species such *Carex pellita* (woolly sedge), *Carex praegracilis* (clustered field sedge), *Eleocharis palustris* (common spikerush), *Juncus balticus* (Baltic rush), *Paspalum distichum* (knotgrass), *Schoenoplectus americanus* (chairmaker's bulrush), *Schoenoplectus pungens* (common threesquare), *Typha domingensis* (southern cattail), *Typha latifolia* (broadleaf cattail), and species of *Bidens* (beggarticks), *Cicuta* (water-hemlock), *Cyperus* (flatsedge), *Mimulus* (monkeyflower), and *Phalaris* (canarygrass).....**G6**
..... M888 Arid West Interior Freshwater Marsh

M075 Western North American Montane-Subalpine-Boreal Marsh, Wet Meadow & Shrubland

G3a. Riparian shrublands, wet meadows and marshes found in montane and higher elevations **G4**
G3b. Wetlands dominated by herbaceous species. **G6**

G4a. Wetlands at high altitudes. The following 4 groups occur within MG075. They are found at high altitudes; they are listed here for information, but are not keyed, nor are their alliances. .....
.....G547 Western Boreal Alkaline Swamp
..... G528 Western North American Boreal Wet Meadow & Marsh
..... G521 Vancouverian-Rocky Mountain Montane Wet Meadow & Marsh
.....G520 Vancouverian-Rocky Mountain Subalpine-Alpine Snowbed, Wet Meadow & Dwarf-shrubland

G4b. Wetlands at lower montane or even subalpine altitudes, are near or adjacent to sage grouse habitat, and are wetland types known to be used by sage grouse. **G5**

G5a. Lowland foothill, valley bottom and lower montane riparian shrublands dominated by low to tall shrubs such as *Acer glabrum* (Rocky Mountain maple), *Artemisia* (sagebrush) spp., *Cornus sericea* (red-osier dogwood), *Crataegus* (hawthorn) spp., *Dasiphora fruticosa ssp. floribunda* (shrubby-cinquefoil), *Forestiera pubescens* (stretchberry), *Oplopanax horridus* (devil's-club), *Philadelphus lewisii* (Lewis' mock orange), *Prunus virginiana* (chokecherry), *Rhus trilobata* (skunkbush sumac), *Rosa* (rose) spp., *Salix* (willow) spp., *Shepherdia argentea* (silver buffaloberry), and *Symphoricarpos* (snowberry) spp. At and below lower treeline, generally not up in the mountains, but rather in between mountain valleys and lowlands of the Interior West. **A7**
..... G526 Rocky Mountain-Great Basin Lowland-Foothill Riparian Shrubland

G5b. Montane to subalpine riparian shrublands; generally dominated by any or a mix of *Alnus incana* (gray alder), *Alnus viridis* (green alder), *Betula glandulosa* (resin birch), *Betula occidentalis* (water birch), *Cornus sericea* (red-osier dogwood), *Salix bebbiana* (Bebb willow), *Salix boothii* (Booth's willow), *Salix brachycarpa* (shortfruit willow), *Salix drummondiana* (Drummond's willow), *Salix eriocephala* (Missouri River willow), *Salix geyeriana* (Geyer's willow), *Salix monticola* (park willow), *Salix planifolia* (diamondleaf willow), and/or *Salix wolfii* (Wolf's

willow). Occur in steep and narrow to wide, low-gradient valley bottoms and floodplains as well as steep moist avalanche chutes. **A9**
..... G527 Western Montane-Subalpine Riparian & Seep Shrubland

M301 Western North American Ruderal Marsh, Wet Meadow & Shrubland

G6a. Wet meadows dominated by non-native species such as *Agrostis gigantea* (redtop), *Agrostis stolonifera* (creeping bentgrass), *Alopecurus pratensis* (meadow foxtail), *Conyza canadensis* (Canadian horseweed), *Cirsium arvense* (Canada thistle), *Sonchus* (sowthistle) spp., *Lactuca serriola* (prickly lettuce), *Phalaris arundinacea* (reed canarygrass), *Phragmites australis* (common reed), *Poa palustris* (fowl bluegrass), and/or *Poa pratensis* (Kentucky bluegrass) that occur in the same physical settings as native wet meadows found throughout the western U.S. and southern Canada. **A21**
..... G524 Western North American Ruderal Marsh, Wet Meadow & Shrubland

M888 Arid West Interior Freshwater Marsh

G6b. Arid west freshwater marshes dominated by native species such as *Carex pellita* (woolly sedge), *Carex praegracilis* (clustered field sedge), *Eleocharis palustris* (common spikerush), *Juncus balticus* (Baltic rush), *Paspalum distichum* (knotgrass), *Schoenoplectus americanus* (chairmaker's bulrush), *Schoenoplectus pungens* (common threesquare), *Typha domingensis* (southern cattail), *Typha latifolia* (broadleaf cattail), and species of *Bidens* (beggarticks), *Cicuta* (water-hemlock), *Cyperus* (flatsedge), *Mimulus* (monkeyflower), and *Phalaris* (canarygrass). Found at all elevations below alpine in the semi-arid interior basins and mountains of western U.S., including the western Great Plains.....**A25**
..... G531 Arid West Interior Freshwater Marsh

G526 Rocky Mountain-Great Basin Lowland-Foothill Riparian Shrubland

A7a. Tall riparian shrublands dominated by *Salix exigua* (narrowleaf willow), *Salix irrorata* (dewystem willow), and/or *Salix melanopsis* (dusky willow). Typically with continuous cover of 60-100%. Along streamsides, marshes and wet ditches throughout the western U.S. .....
..... A3800 Salix exigua - Salix irrorata Shrubland Alliance

A7b. Riparian shrublands not like above in all respects **A8**

A8a. Dominated by *Artemisia cana ssp. viscidula* (silver sagebrush) or *Artemisia cana ssp. bolanderi* (silver sagebrush). In relatively moist environments, including riparian areas, alkaline or saline playa lakes, throughout the northern half of the Intermountain West. .....
..... A2557 Artemisia cana Wet Shrubland Alliance

A8b. Shrublands dominated by *Corylus cornuta* (beaked hazelnut), *Crataegus rivularis* (river hawthorn), *Elaeagnus commutata* (silverberry), *Forestiera pubescens* (stretchberry), *Rhamnus alnifolia* (alderleaf buckthorn), *Shepherdia argentea* (silver buffaloberry), and/or *Rhus trilobata* (skunkbush sumac). Usually single-species shrublands, small, narrow stands at the base of steep hills and cliffs and along washes and upper benches and terraces of riparian areas in the Rocky Mountains and throughout the cool interior western U.S. Near but not necessarily in the wettest part of riparian areas. .....
..... A3799 Rhus trilobata - Crataegus rivularis - Forestiera pubescens Shrubland Alliance

G527 Western Montane-Subalpine Riparian & Seep Shrubland

A9a. Riparian shrublands dominated by non-willows **A10**
A9b. Riparian shrublands dominated by *Salix* (willows). **A14**

A10a. Riparian shrublands dominated by *Alnus* (alder), *Betula* (birch) and/or *Cornus* (dogwood).....**A12**
A10b. Riparian shrublands dominated by *Crataegus douglasii* (black hawthorn), *Celtis laevigata var. reticulata* (netleaf hackberry) and/or *Philadelphus lewisii* (Lewis' mock orange). **A11**

A11a. Shrublands dominated by *Crataegus douglasii* (black hawthorn), often forming dense thickets. Lower montane and foothill regions of the Columbia Basin, north and east into the Central Rockies in Idaho and northwestern Wyoming. .....
..... A3974 Crataegus douglasii / Symphoricarpos albus Wet Shrubland Alliance

A11b. *Celtis laevigata var. reticulata* (netleaf hackberry)- and/or *Philadelphus lewisii* (Lewis' mock orange)-dominated scrub woodland and shrublands; lower montane and foothill regions around the Columbia Basin, Idaho and northwestern Wyoming. Numerous relatively small stands, valley bottoms along riparian margins, on lower slopes of river terraces near seepage lines, and on scree slopes. .....
..... A3973 Celtis laevigata var. reticulata / Philadelphus lewisii Wet Scrub Alliance

A12a. Shrublands dominated by *Cornus sericea* (red-osier dogwood), *Dasiphora fruticosa ssp. floribunda* (shrubby-cinquefoil), *Rosa woodsii* (Woods' rose), *Ribes lacustre* (prickly currant), and/or *Ribes hudsonianum* (northern black currant). Wet valley bottoms and lower slopes that have seasonal subirrigation. .....
A3773 Cornus sericea - Dasiphora fruticosa ssp. floribunda - Ribes spp. Wet Shrubland Alliance

A12b. Shrublands dominated by *Alnus incana* (gray alder), *Alnus viridis ssp. sinuata* (Sitka alder), and/or *Betula occidentalis* (water birch) **A13**

A13a. Dense tall shrublands of *Alnus incana* (gray alder) or *Alnus viridis ssp. sinuata* (Sitka alder), sometimes with *Acer circinatum* (vine maple). Adjacent to streams and in mountain meadows at moderate to high-elevation (1200-3000 m) northern Rocky Mountains and Cascade Range where deep snow accumulations are common. .....
..... A3771 Alnus incana - Alnus viridis Wet Shrubland Alliance

A13b. Dense, closed canopy shrublands, dominated by *Betula occidentalis* (water birch). Moderately wide stream benches, floodplains, hillside seeps in the mountains and foothills. Rocky Mountains, intermountain ranges of Nevada and Sierra Nevada of California.....
..... A3772 Betula occidentalis Wet Shrubland Alliance

A14a. Short statured (generally <1.5 m (5 ft)) riparian and wetland shrublands at high, upper montane and subalpine elevations, dominated by *Salix commutata* (undergreen willow), *Salix orestera* (Sierra willow), *Salix brachycarpa* (shortfruit willow), *Salix farriae* (Farr's willow), *Salix planifolia* (diamondleaf willow), and/or *Salix wolfii* (Wolf's willow). **A15**

A14b. Tall statured (generally >1.5 m, (5 ft) tall) willow dominated shrublands at lower altitudes.....**A17**

A15a. Dense shrubland up to 2 m in height, dominated by *Salix orestera* (Sierra willow). Low-gradient basin floors, streamsides, and wet meadows around 3050-3200 m (10,000-10,500 feet) elevation in the Sierra Nevada of California and in Oregon and Nevada. .....
..... A2563 Salix orestera Wet Shrubland Alliance

A15b. Vegetation not like above in all respects.....**A16**

A16a. *Salix commutata* (undergreen willow) dominates; narrow riparian zones along upper reaches of streams and elongated openings in higher elevation forests. Typically between 2065 and 2220 m in British Columbia, Oregon, Washington, Idaho, western Montana and just into northern California; possibly as far east as Wyoming.....
..... A1003 Salix commutata Wet Shrubland Alliance

A16b. Sublpine to alpine shrublands of Intermountain West and Rocky Mountains; dominated by *Betula glandulosa* (resin birch), *Salix brachycarpa* (shortfruit willow), *Salix farriae* (Farr's willow), *Salix planifolia* (diamondleaf willow), and/or *Salix wolfii* (Wolf's willow). Understory typically dense, graminoid-dominated, occasionally forb-dominated, including *Carex aquatilis* (water sedge), *Carex microptera* (smallwing sedge), *Carex scopulorum* (mountain sedge), *Carex utriculata* (Northwest Territory sedge)), *Deschampsia caespitosa* (tufted hairgrass), and others. Forb species may include *Caltha leptosepala* (white marsh-marigold), *Fragaria virginiana* (Virginia strawberry), *Pedicularis groenlandica* (elephanthead lousewort), *Swertia perennis* (felwort), and others. .....
..... A3770 Salix wolfii - Salix brachycarpa - Betula glandulosa Wet Shrubland Alliance

A17a. Wet, tall shrublands dominated by *Salix lasiolepis* (arroyo willow); stream benches, seeps, or as stringer communities along drainages, between 259 and 2490 m. .....
..... A0977 Salix lasiolepis Wet Shrubland Alliance

A17b. Vegetation not like above in all respects.....**A18**

A18a. Riparian shrublands dominated by *Salix eastwoodiae* (mountain willow) and/or *Salix lemmonii* (Lemmon's willow). Other species such as *Salix planifolia* (diamondleaf willow), *Salix boothii* (Booth's willow), and *Betula glandulosa* (resin birch) may occur. Glacial valley bottoms (e.g., seeps, toeslopes, benches, and stream benches), wet mountain meadows, and streambanks with gentle slopes (3%) from 2300-3200 m.....
..... A3774 Salix eastwoodiae - Salix lemmonii Wet Shrubland Alliance

A18b. Shrublands <u>not</u> dominated by *Salix eastwoodiae* (mountain willow) and/or *Salix lemmonii* (Lemmon's willow).....**A19**

A19a. Tall (>1.5 m) riparian and wetland shrublands of single- or mixed-*Salix* (willow) species, including *Salix bebbiana* (Bebb willow), *Salix boothii* (Booth's willow), *Salix drummondiana* (Drummond's willow), *Salix eriocephala* (Missouri River willow), *Salix geyeriana* (Geyer's willow), *Salix ligulifolia* (strapleaf willow), *Salix lucida ssp. caudata* (greenleaf willow), *Salix lucida ssp. lasiandra* (Pacific willow), *Salix lutea* (yellow willow), *Salix planifolia* (diamondleaf willow), and *Salix prolixa* (MacKenzie's willow). Widespread from eastern Oregon and Washington, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, New Mexico, and Arizona.. **.....A3769 Salix boothii - Salix geyeriana - Salix lutea Montane Wet Shrubland Alliance**

A19b. Montane riparian shrublands of tall, dense canopy of *Salix monticola* (park willow) often with other willow species such as *Salix geyeriana* (Geyer's willow), *Salix drummondiana* (Drummond's willow), *Salix lucida ssp. lasiandra* (Pacific willow), *Salix planifolia* (diamondleaf willow), and *Salix wolfii* (Wolf's willow). Rocky Mountains between 2310 and 3350 m along stream reaches in wide to narrow valleys (20-500 m) with broad, swift-moving streams and active, flat (3-8%) floodplains. **..... A0981 Salix monticola Wet Shrubland Alliance**

A20a. Stands of native willows and/or native *Artemisia cana* (silver sagebrush) sagebrush with non-native grasses and forbs dominant in the understory, found in western U.S. streams and floodplains. **.. A4217 Salix spp. - Artemisia cana Ruderal Understory Wet Shrubland Alliance**

A20b. Vegetation not like above in all respects.....**A21**

G524 Western North American Ruderal Marsh, Wet Meadow & Shrubland

A21a. Tall robust herbaceous marsh vegetation dominated by non-native grasses such as *Phalaris arundinacea* (reed canarygrass), *Phragmites australis ssp. australis* (European common reed), Arundo donax (giant reed), and/or Alopecurus pratensis (meadow foxtail). **A22**

A21b. Vegetation not like above in all respects.....**A23**

A22a. Dominated by *Phalaris arundinacea* (reed canarygrass), which tends to occur in monocultures; mesic to wet disturbed areas and along rivers that no longer flood throughout the western U.S. **..... A3846 Phalaris arundinacea Western Ruderal Marsh Alliance**

A22b. Common reed marsh alliance dominated by introduced *Phragmites australis ssp. australis* (European common reed), Arundo donax (giant reed), and/or Alopecurus pratensis (meadow foxtail). Temperate regions of the western U.S. and Canada. ..... **. A3847 Phragmites australis - Arundo donax - Alopecurus pratensis Ruderal Marsh Alliance**

A23a. Non-native forb-dominated waste and other disturbed places of the western U.S. dominated by such species as *Conyza canadensis* (Canadian horseweed), *Cirsium arvense* (Canada thistle), or *Lactuca serriola* (prickly lettuce) (other species may be present to dominant). ..... **A3849 Conyza canadensis - Cirsium arvense - Lactuca serriola Ruderal Wet Meadow Alliance**

A23b. Grasslands dominated by introduced grasses very common and widespread in the western U.S. where they have invaded natural meadows, wetlands and riparian areas. **A24**

A24a. Dominated or codominated by the exotic perennial forage grass *Sorghum halepense* (Johnsongrass), with a variety of associated species (*Amaranthus palmeri* (carelessweed), *Prosopis velutina* (velvet mesquite), *Chenopodium berlandieri* (pitseed goosefoot), *Chloris virgata* (feather fingergrass), *Eragrostis* (lovegrass) spp., *Eriochloa acuminata* (tapertip cupgrass), *Ipomoea* (morning-glory) spp., *Kallstroemia grandiflora* (Arizona poppy), *Leptochloa panicea* (sprangeltop), *Salsola kali* (Russian thistle), and *Solanum elaeagnifolium* (silverleaf nightshade). Northern Mexico, Arizona and elsewhere in the desert southwestern U.S., probably does not occur in the central Great Basin. ..... **..... A2020 Sorghum halepense Ruderal Desert Grassland Alliance**

A24b. Grasslands dominated by introduced grasses such as *Agrostis gigantea* (redtop), *Agrostis stolonifera* (creeping bentgrass), *Alopecurus pratensis* (meadow foxtail), or *Poa pratensis* (Kentucky bluegrass), Very common and widespread in the western U.S. where it has invaded natural meadows, wetlands and riparian areas. ..... **..... A3848 Poa pratensis - Agrostis gigantea - Agrostis stolonifera Ruderal Marsh Alliance**

G531 Arid West Interior Freshwater Marsh

A25a. Bulrush or cattail marshes **A26**

A25b. Lower stature marshes dominated by other taxa. **A27**

A26a. Freshwater bulrush marshes, the most abundant species are *Schoenoplectus acutus* (hardstem bulrush), *Schoenoplectus americanus* (chairmaker's bulrush), *Schoenoplectus californicus* (California bulrush), *Schoenoplectus fluviatilis* (river bulrush), *Schoenoplectus maritimus* (cosmopolitan bulrush), *Schoenoplectus pungens* (common threesquare), *Schoenoplectus tabernaemontani* (softstem bulrush), and/or Scirpus microcarpus (panicled bulrush). Sites flooded (on average 1 m deep) for most of the growing season. ..... **.. A3895 Schoenoplectus americanus - Schoenoplectus acutus - Schoenoplectus californicus Marsh Alliance**

A26b. Cattail freshwater marshes dominated by *Typha angustifolia* (narrowleaf cattail), *Typha domingensis* (southern cattail), and/or *Typha latifolia* (broadleaf cattail); can be monotypic or mixed with bulrush species such as *Schoenoplectus acutus* (hardstem bulrush), *Schoenoplectus americanus* (chairmaker's bulrush), or *Schoenoplectus pungens* (common threesquare). Most commonly along lake margins and in shallow basins, and occasionally in river backwaters. ..... **..... A3896 Typha domingensis - Typha latifolia - Typha angustifolia Western Marsh Alliance**

A27a. Dense, nearly monotypic stands dominated by *Paspalum distichum* (knotgrass). Mud or sand flats, moist places, marshes and ditches of low valleys of Oregon, Washington, Nevada and California. **..... A3894 Paspalum distichum Marsh Alliance**

A27b. Vegetation not like above in all respects.....**A28**

A28a. Marshes and low areas dominated or codominated by *Eleocharis palustris* (common spikerush) and/or *Eleocharis macrostachya* (pale spikerush). Shallow, mostly still water throughout much of the western United States and into northern Mexico, from sea level to upper montane altitudes on a variety of landforms. ..... **..... A3891 Eleocharis palustris - Eleocharis macrostachya Marsh Alliance**

A28b. Marshes or other wet low-lying areas dominated by emergent *Equisetum fluviatile* (water horsetail), *Equisetum laevigatum* (smooth horsetail), and/or *Equisetum x ferrissii* (Ferriss' horsetail) all of which can form monotypic stands. Water is shallow (<1 m) over mineral soils, usually sand/or silt, along wave-washed shores and stream channels of the western U.S. and Canada.**..... A3892 Equisetum fluviatile - Equisetum x ferrissii Marsh Alliance**

2.C.5 Salt Marsh

D036 North American Western Interior Brackish Marsh, Playa & Shrubland

M1a. Macrogroup of alkaline and saline wetlands with salt-tolerant plant growth; characteristic species include *Atriplex* (saltbush) spp., *Distichlis spicata* (saltgrass), *Isocoma acradenia* (alkali goldenbush), *Salicornia* (pickleweed) spp., *Sarcobatus vermiculatus* (greasewood), *Sesuvium verrucosum* (verrucose seapurslane), *Sporobolus* (dropseed) spp., *Suaeda moquinii* (Mojave seablite), and *Triglochin maritima* (seaside arrowgrass). Playas, washes, mudflats and depressional wetlands where evaporation far exceeds precipitation and/or where bedrock and soil properties contribute to alkaline/saline conditions; western Great Plains to the west coast; southwestern Canada. .....**G2** **..... M082 Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland**

M1b. There is only one macrogroup in this division **G2**

M082 Warm & Cool Desert Alkali-Saline Marsh, Playa & Shrubland

G2a. Saline scrub wetlands of the western Great Plains, Intermountain West, extending into Central Valley and San Joaquin Valley in California south into Baja California. Characteristic species include *Atriplex* (saltbush) spp., *Allenrolfea occidentalis* (iodinebush), *Pluchea sericea* (arrowweed), *Salicornia rubra* (red swampfire), *Sarcobatus vermiculatus* (greasewood), *Sesuvium verrucosum* (verrucose seapurslane), and/or *Suaeda moquinii* (Mojave seablite).....**A3** **..... G537 North American Desert Alkaline-Saline Wet Scrub**

G2b. Alkaline-saline marshes of non-coastal and non-tidal areas; cover varies from dense to sparsely vegetated playas where soils and water (if present) are alkaline. Characteristic species include *Distichlis spicata* (saltgrass), *Eleocharis palustris* (common spikerush), *Eleocharis rostellata* (beaked spikerush), *Leymus cinereus* (basin wildrye), *Leymus triticoides* (beardless wildrye), *Muhlenbergia* (muhly) spp., *Puccinellia lemmonii* (Lemmon's alkaligrass), *Salicornia* (pickleweed) spp., *Sporobolus airoides* (alkali sacaton), and *Triglochin maritima* (seaside arrowgrass). .....**A9** **..... G538 North American Desert Alkaline-Saline Marsh & Playa**

G537 North American Desert Alkaline-Saline Wet Scrub

A3a. Dominated by *Atriplex* species or *Sarcobatus vermiculatus* **A4**

A3b. Vegetation not like above **A7**

A4a. Shrublands dominated by *Sarcobatus vermiculatus* (greasewood). Lowland sites in plains, mountain valleys and intermountain basins in semi-arid western U.S., generally flat, poorly drained, seasonally, temporarily or intermittently flooded sites with a shallow or perched water table; alkali flats around playas and floodplains along stream channels..... **..... A1046 Sarcobatus vermiculatus Intermountain Wet Shrubland Alliance**

A4b. Dominated by *Atriplex* (salt bush) species **A5**

A5a. Saltbush shrubland of the southwest dominated by *Atriplex spinifera* (spinescale saltbush) in intermittently flooded habitats; soils often carbonate rich. ..... **..... A0865 Atriplex spinifera Wet Shrubland Alliance**

A5b. Dominated by other *Atriplex* (saltbush) species **A6**

A6a. Dominated by *Atriplex parryi.* **..... A2507 Atriplex parryi Wet Shrubland Alliance**

A6b. *Atriplex lentiformis* (big saltbush) is dominant or codominant; on southeast- and southwest-facing slopes.**..... A3173 Atriplex lentiformis Wet Shrubland Alliance**

A7a. Characterized by saline wet species *Suaeda moquinii* (Mojave seablite) and/or *Salicornia rubra* (red swampfire); *Isocoma acradenia* (alkali goldenbush) occasionally dominant. Moist or seasonally dry flats, margins of intermittently flooded playas, and low coastal areas. Generally have low to sparse cover (<10% total vegetation). Primarily warm deserts of southwest North America..... **..... A3880 Suaeda moquinii - Salicornia rubra Alkaline Wet Scrub Alliance**

A7b. Stands not above in all respects **A8**

A8a. Flats dominated by *Allenrolfea occidentalis* (iodinebush); saline habitats throughout the arid intermountain western United States, such as alkaline flats along the margins of salt lakes, in depressions among gypsum ridges, and along washes in saline overflow areas..... **..... A0866 Allenrolfea occidentalis Wet Shrubland Alliance**

A8b. Dominated by *Pluchea sericea* (arrowweed) with or without other shrubs..... **..... A0798 Pluchea sericea Wet Shrubland Alliance**

G538 North American Desert Alkaline-Saline Marsh & Playa

A9a. Dominated or codominated by *Eleocharis palustris* (common spikerush) or *Eleocharis rostellata* (beaked spikerush). Other salt-tolerant species may also be present: *Carex aquatilis* (water sedge), *Distichlis spicata* (saltgrass), *Glaux maritima* (sea milkwort), *Juncus balticus* (Baltic rush), and *Muhlenbergia asperifolia* (scratchgrass). Adjacent to salt waterbodies or on the margins of high-evaporation playas of central Intermountain West basins. Surface water, if present, is highly saline. ..... **..... A3930 Eleocharis palustris - Eleocharis rostellata Alkaline-Saline Marsh Alliance**

A9b. Vegetation not like above in all respects.....**A10**

A10a. Alkaline/saline wet meadows dominated by graminoids *Leymus cinereus* (basin wildrye), *Leymus triticoides* (beardless wildrye), *Muhlenbergia asperifolia* (scratchgrass), *Puccinellia lemmonii* (Lemmon's alkaligrass), *Puccinellia nuttalliana* (Nuttall's alkaligrass), *Spartina gracilis* (alkali cordgrass), and/or *Sporobolus airoides* (alkali sacaton) and/or *Hordeum jubatum* (foxtail barley) **A11**

A10b. Alkaline/saline wet meadows dominated by *Frankenia salina* (alkali seaheath) , *Distichlis spicata* (saltgrass) and/or other salt-tolerant species.....**A14**

A11a. Alkaline/saline wet meadows or playas dominated by *Leymus cinereus* (basin wildrye), *Leymus triticoides* (beardless wildrye) or *Hordeum jubatum* (foxtail barley) **A12**

A11b. Alkaline/saline wet meadows or playas dominated by *Muhlenbergia asperifolia* (scratchgrass), *Puccinellia lemmonii* (Lemmon's alkaligrass), *Puccinellia nuttalliana* (Nuttall's alkaligrass), *Spartina gracilis* (alkali cordgrass), and/or *Sporobolus airoides* (alkali sacaton), ...**A13**

A12a. *Leymus cinereus* (basin wildrye)- and *Leymus triticoides* (beardless wildrye)-dominated grasslands of alkaline/saline wet meadows; Intermountain West, including the Great Basin and Columbia River Basin, as well as and California's Central Valley and coastal plains. ..... **..... A1329 Leymus cinereus - Leymus triticoides Alkaline Wet Meadow Alliance**

A12b. Grasslands dominated by *Hordeum jubatum* (foxtail barley) found in lowlands with moderately to strongly saline or alkaline soils.**..... ..... A3932 Hordeum jubatum Alkaline Wet Meadow Alliance**

A13a. Sparse to dense grasslands/meadows dominated by *Muhlenbergia asperifolia* (scratchgrass), *Puccinellia lemmonii* (Lemmon's alkaligrass), *Puccinellia nuttalliana* (Nuttall's alkaligrass), *Spartina gracilis* (alkali cordgrass), and/or *Sporobolus airoides* (alkali sacaton), singly or mixed. Lowland habitats- playas, swales, terraces along intermittently flooded washes, and flats that are alkaline or moderately saline. ..... **..... A1334 Sporobolus airoides - Muhlenbergia asperifolia - Spartina gracilis Alkaline Wet Meadow Alliance**

A13b. Vegetation not like above in all respects.....**A14**

A14a. Salt marsh and playas dominated by the subshrub *Frankenia salina* (alkali seaheath) often codominant with *Distichlis spicata* (saltgrass) and/or other salt-tolerant species. ..... **..... A4241 Frankenia salina Salt Marsh & Playa Alliance***

A14b. Vegetation not like above in all respects.....**A15**

A15a. Non-tidal; dominated by *Distichlis spicata* (saltgrass). Playas and ephemeral streams with sparse to dense herbaceous cover; on deep, saline, alkaline and fine-textured soils. Widespread in semi-arid western U.S. with variable flood regimes. **..... ..... A1332 Distichlis spicata Alkaline Wet Meadow Alliance**

A15b. Open scrub canopy dominated by *Sesuvium verrucosum*, generally <25% total vegetation. Alkaline wetlands on moist or seasonally dry flats, margins of intermittently flooded desert playas and coastal plains across the warm deserts of North America. ..... **..... A3879 Sesuvium verrucosum Desert Salt Mudflat Scrub Alliance**