

Field Keys to Groups and Alliances in the National Vegetation Classification: Wyoming Basin Ecoregion



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Photos (clockwise from top left; all used under Creative Commons license CC BY 2.0.):
Big sage shrubland, Humboldt-Toiyabe National Forest, Nevada. USDA Photo by Susan Elliot.
<http://flic.kr/p/ax64DY>
Jeffrey pine woodland, photo by David Prasad. <https://www.flickr.com/photos/33671002@N00>
Northwest Great Plains Mixedgrass Prairie, Dakota Prairie National Grasslands, North Dakota.
Western juniper woodland, BLM Black Hills Recreation Area, Oregon.

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Introduction and Background

BLM manages extensive lands that support a variety of vegetation types that have been classified and mapped at 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 keys 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 d) 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 partner 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

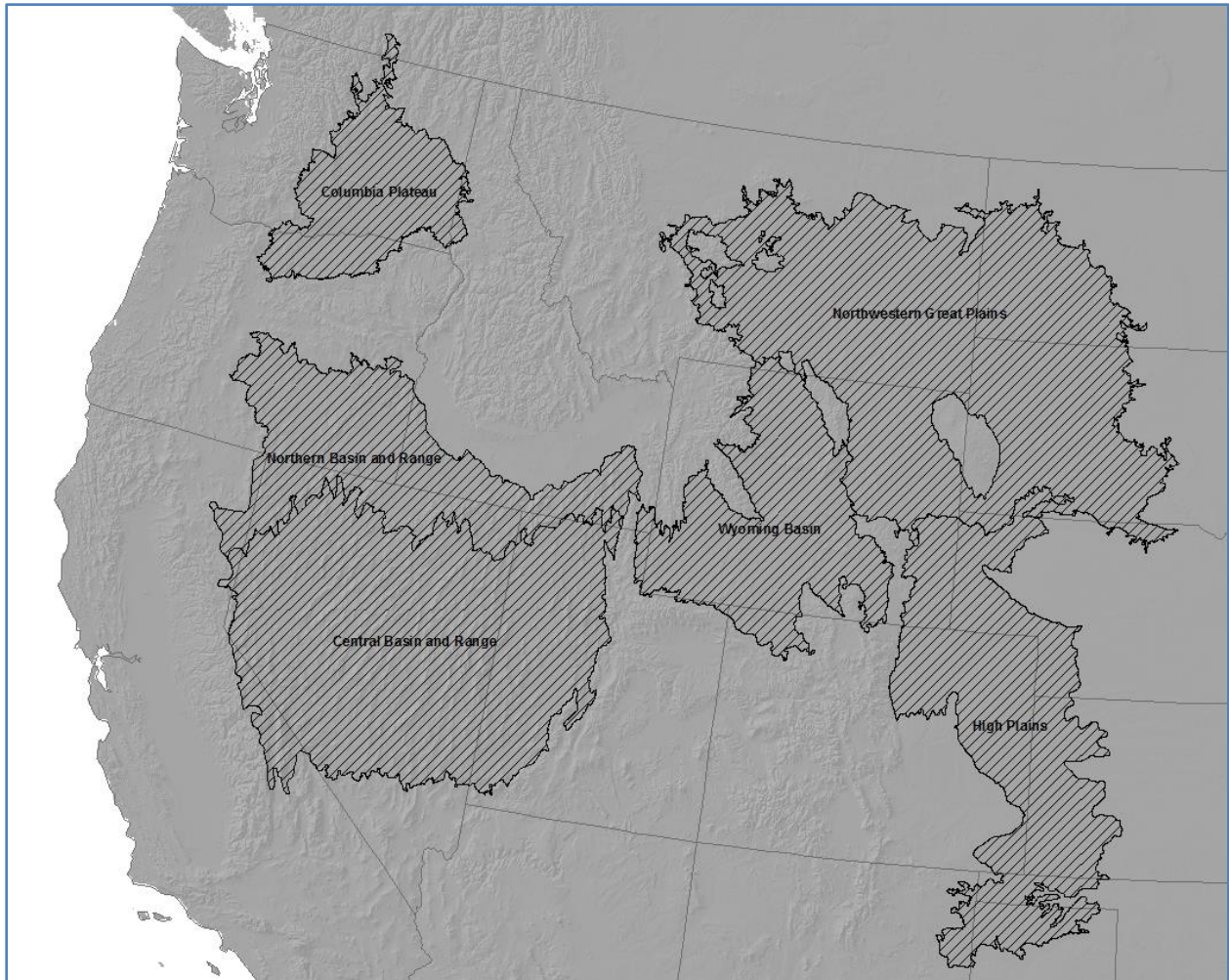


Figure 1. EPA Ecoregions used to organize field keys to the Groups and Alliances of the National Vegetation Classification (NVC) that are found in these ecoregions. NVC types found in the Northern Basin and Range and Columbia Plateau ecoregions were combined into one key. Types found in the northern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

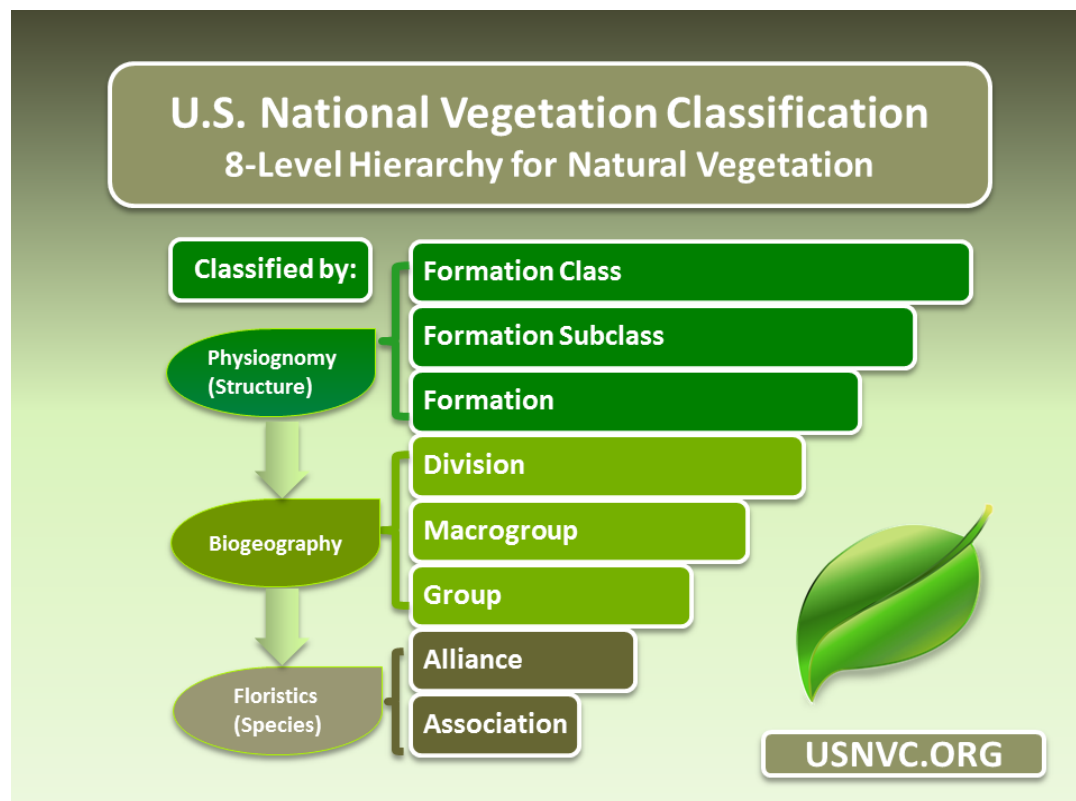


Figure 2. Summary of the primary criteria used to define the various levels of the USNVC.

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 are 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 are 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 are not 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: <i>Artemisia tridentata</i> - <i>Atriplex confertifolia</i> / <i>Hesperostipa comata</i> 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.	<p>Colloquial Name: Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland</p> <p>Scientific Name: <i>Artemisia tridentata</i> - <i>Artemisia tripartita</i> ssp. <i>tripartita</i> - <i>Purshia tridentata</i> Steppe & Shrubland Code: M169</p>
	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.	<p>Colloquial Name: Intermountain Dry Tall Sagebrush Steppe & Shrubland</p> <p>Scientific Name: <i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> - <i>Artemisia tridentata</i> ssp. <i>tridentata</i> Steppe & Shrubland Code: G303</p>
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.	<p>Colloquial Name: Wyoming Big Sagebrush Dry Shrubland</p> <p>Scientific Name: <i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> Dry Steppe & Shrubland Code: A3184</p>
	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.	<p>Colloquial Name: Wyoming Big Sagebrush / Indian Ricegrass Shrubland</p> <p>Scientific Name: <i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> / <i>Achnatherum hymenoides</i> Shrubland Code: CEGL001046</p>

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 Wyoming Basin Ecoregion

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

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Introduction

This is a field key of seven upland and six wetland/riparian divisions from the Wyoming Basin ecoregion.

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).
..... **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**

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

- D17a.** Freshwater wetlands **D18**
- 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* (ocotillo), *Larrea* (creosotebush), *Muhlenbergia* (muhlytotal), *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**

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

1.B.2 Cool Temperate Forest & Woodland

D194 Rocky Mountain Forest & Woodland

M1a. This macrogroup comprises conifer forests, woodlands and savannas found on dry settings of the lower montane to foothill zones of the interior Pacific Northwest, and extending east into the northwestern Great Plains on escarpments and rock outcrops. *Pinus ponderosa* var. *ponderosa* (ponderosa pine) or *Pinus ponderosa* var. *scopulorum* (ponderosa pine), *Pseudotsuga menziesii* (Douglas-fir), *Pinus flexilis* (limber pine), or *Juniperus osteosperma* (Utah juniper) or *Juniperus scopulorum* (Rocky Mountain juniper). Other occasional trees may include *Pinus contorta* (lodgepole pine), *Picea engelmannii* (Engelmann spruce), *Picea glauca* (white spruce) (or their hybrid), and in the Great Plains, deciduous trees such as *Acer negundo* (box-elder), *Betula papyrifera* (paper birch), *Fraxinus pennsylvanica* (green ash), *Populus tremuloides* (quaking aspen), *Quercus macrocarpa* (bur oak), and *Ulmus americana* (American elm).....**G3**

..... **M501 Central Rocky Mountain Dry Lower Montane-Foothill Forest**

M1b. Vegetation is not as above.**M2**

M2a. 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.....**G4**

..... **M020 Rocky Mountain Subalpine-High Montane Conifer Forest**

M2b. 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).....**G8**

..... **M022 Southern Rocky Mountain Lower Montane Forest**

M501 Central Rocky Mountain Dry Lower Montane-Foothill Forest

G3a. This foothill woodland group has an open-tree canopy or patchy canopy dominated by either *Pinus flexilis* (limber pine), *Juniperus osteosperma* (Utah juniper), or *Juniperus scopulorum* (Rocky Mountain juniper); found on rocky sites in the Rocky Mountains from southern Alberta to central Colorado, including escarpments and low hills across Wyoming and the western Great Plains.....**A10**

..... **G209 Pinus flexilis - Juniperus scopulorum Rocky Mountain Foothill Woodland**

G3b. This *Pseudotsuga menziesii* (Douglas-fir)-dominated forest and woodland group occurs throughout the middle Rocky Mountains of central and southern Idaho, south and east into the Greater Yellowstone region, including the Bighorn, Gros Ventre and Wind River ranges of Wyoming, and north into Montana on the east side of the Continental Divide to near the McDonald Pass and also along the Rocky Mountain Front region and central "sky island" ranges of Montana. In the Central Rockies the southern monsoon influence is less and maritime climate regime is not important, and so stands lack maritime floristics. Additional trees present include *Populus tremuloides* (quaking aspen) in relatively mesic sites, *Pinus flexilis* (limber pine) on calcareous substrates and *Pinus contorta* (lodgepole pine) at higher elevations.....**A13**

..... **G215 Middle Rocky Mountain Montane Douglas-fir Forest & Woodland**

M020 Rocky Mountain Subalpine-High Montane Conifer Forest

G4a. 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

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- Mountains but occurs in the montane and subalpine zones throughout much of the western U.S., south into northern Mexico and north into Canada.**A14**
..... **G222 Rocky Mountain Subalpine-Montane Aspen Forest & Woodland**
- G4b.** Vegetation dominated by conifers. *Populus tremuloides* may be present to codominant, but not dominant.**G5**
- G5a.** Vegetation is a high-elevation forest dominated by *Picea engelmannii* (Engelmann spruce) and/or *Abies lasiocarpa* (subalpine fir).....**G6**
- G5b.** Vegetation is a high-elevation forest, woodland, or krummholz characterized by *Pinus flexilis* (limber pine), *Pinus longaeva* (Great Basin bristlecone pine) *Picea glauca* (white spruce), *Pinus contorta* (lodgepole pine), *Pinus aristata* (Rocky Mountain bristlecone pine), or *Pinus albicaulis* (whitebark pine).....**G7**
- G6a.** 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).....**A17**
..... **G219 Rocky Mountain Subalpine Dry-Mesic Spruce - Fir Forest & Woodland**
- G6b.** 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 empetrifloris* (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.....**A21**
..... **G218 Rocky Mountain Subalpine Moist Spruce - Fir Forest & Woodland**
- G7a.** This group occupies upper montane and subalpine elevations of the Rocky Mountains, and is dominated by *Pinus contorta* (lodgepole pine) with shrub, grass, or barren understories, typically on well-drained, gravelly, coarse-textured, and acidic parent materials.**A25**
..... **G220 Rocky Mountain Lodgepole Pine Forest & Woodland**
- G7b.** Vegetation is not as above. Other forests and woodlands characterized by *Picea glauca* (white spruce), *Pinus flexilis* (limber pine), *Pinus aristata* (Rocky Mountain bristlecone pine), *Larix lyallii* (subalpine larch), and *Pinus albicaulis* (whitebark pine) that occurs as Groups within the Rocky Mountain Subalpine-High Montane Conifer Forest Macrogroup, but are not found in the Wyoming Basin ecoregion are listed below. No alliances from these groups are included in this key..... **G221 Rocky Mountain Subalpine-Montane Limber Pine - Bristlecone Pine Woodland***
..... **G223 Northern Rocky Mountain Whitebark Pine - Subalpine Larch Woodland***
..... **G345 Central Rocky Mountain Montane White Spruce Forest***

M022 Southern Rocky Mountain Lower Montane Forest

- G8a.** 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.....**A27**
..... **G226 Southern Rocky Mountain White Fir - Douglas-fir Dry Forest**
- G8b.** 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**

G9a. 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.**A31**
**G229 Southern Rocky Mountain Ponderosa Pine Open Woodland**

G9b. 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).**A32**
 **G228 Southern Rocky Mountain Ponderosa Pine Forest & Woodland**

G209 *Pinus flexilis* - *Juniperus scopulorum* Rocky Mountain Foothill Woodland

A10a. Open or patchy woodlands dominated or codominated by either *Pinus flexilis* (limber pine) often with *Juniperus osteosperma* (Utah juniper), or *Juniperus scopulorum* (Rocky Mountain juniper) present to codominant. **11**

A10b. Open or patchy woodlands dominated by *Juniperus osteosperma* (Utah juniper), or *Juniperus scopulorum* (Rocky Mountain juniper). *Pinus flexilis* (limber pine) is typically absent. **12**

11a. This foothill and outcrop woodland alliance has an understory characterized by an open to moderately dense shrub layer. Herbaceous cover is typically low with less than cover than the shrubs.
**A3424 *Pinus flexilis* / Shrub Understory Central Rocky Mountain Woodland Alliance**

11b. This foothill and outcrop woodland alliance has an understory characterized by a moderately dense to low herbaceous cover, typically perennial grass.
 **A3425 *Pinus flexilis* / Grass Understory Central Rocky Mountain Woodland Alliance**

12a. This foothill and outcrop alliance has an understory characterized by an open to moderately dense shrub cover. Shrub cover is typically >10%, but if less, then shrub cover exceeds herbaceous layer.
 **A3426 *Juniperus osteosperma* - *Juniperus scopulorum* / Shrub Understory Central Rocky Mountain Woodland Alliance**

12b. This foothill and outcrop alliance has an understory characterized by a moderately dense to low perennial grass layer. If shrubs are present, then cover is low (<10%) and perennial grass cover exceeds shrub cover.
 **A3427 *Juniperus osteosperma* - *Juniperus scopulorum* / Grass Understory Central Rocky Mountain Woodland Alliance**

G215 Middle Rocky Mountain Montane Douglas-fir Forest & Woodland

A13a. This forest and woodland alliance is dominated by *Pseudotsuga menziesii* (Douglas-fir) and occurs on relatively dry to mesic sites throughout the middle Rocky Mountains of central and southern Idaho, the Greater Yellowstone region, and the Wind River, Gros Ventre and Bighorn ranges of Wyoming and in Montana on the east side of the Continental Divide.....
 **A3462 *Pseudotsuga menziesii* Middle Rocky Mountain Dry-Mesic Forest & Woodland Alliance**

A13b. This forest and woodland alliance is dominated by *Pseudotsuga menziesii* (Douglas-fir) without the maritime floristic composition. It occurs on relatively moist, cool to warm sites throughout the middle Rocky Mountains of central and southern Idaho, the Greater Yellowstone region, and the Wind River, Gros Ventre and Bighorn ranges of Wyoming and in Montana on the east side of the Continental Divide.
 **A3463 *Pseudotsuga menziesii* Middle Rocky Mountain Mesic-Wet Forest Alliance**

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G222 Rocky Mountain Subalpine-Montane Aspen Forest & Woodland

A14a. Vegetation is dominated by *Populus tremuloides* (quaking aspen).**A15**

A14b. Vegetation is dominated or codominated by *Betula papyrifera* or *Acer grandidentatum*. If *Populus tremuloides* (quaking aspen) is present then it has low cover.**A16**

A15a. 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**

A15b. 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***

A16a. This forest and woodland alliance is found in Alberta, Montana, Washington, and Wyoming and dominated by the successional species *Betula papyrifera* (paper birch).

..... **A3367 Betula papyrifera Rocky Mountain Forest & Woodland Alliance***

A16b. 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**

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

A17a. This forest and woodland alliance is dominated by *Abies lasiocarpa* (subalpine fir) and/or *Picea engelmannii* (Engelmann spruce). Stands structure may take on a ribbon forest or tree island form or have understory characterized by alpine herbaceous species. *Pinus flexilis* (limber pine) and *Pinus aristata* (bristlecone pine) if present are minor components in the canopy and very infrequent in the understory. It occurs below krummholz at or near treeline in the Front Range of the Rocky Mountains in Colorado and Wyoming.

..... **A3642 Abies lasiocarpa - Picea engelmannii Treeline Dry-Mesic Forest Alliance***

A17b. Vegetation does not occur at or near upper treeline in the Front Range of the Rocky Mountains in Colorado and Wyoming with a ribbon forest or tree island stand structure or have and understory characterized by alpine herbaceous species.....**A18**

A18a. 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**

A18b. Site is not scree or talus; characterized by *Abies lasiocarpa* (subalpine fir) or *Picea engelmannii* (Engelmann spruce).**A19**

A19a. 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**

A19b. Vegetation is not codominated by *Populus tremuloides* (quaking aspen).....**A20**

A20a. 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**

A20b. 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*

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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* (sickle-top lousewort).
**A3643 Abies lasiocarpa - Picea engelmannii Rocky Mountain Dry-Mesic Forest Alliance**

G218 Rocky Mountain Subalpine Moist Spruce - Fir Forest & Woodland

A21a. The forests are known from the middle and northern Rocky Mountains and eastern Cascades and characterized by a canopy dominated by *Tsuga mertensiana* (mountain hemlock). **A3617 Tsuga mertensiana Rocky Mountain Forest Alliance***

A21b. Vegetation is not dominated by *Tsuga mertensiana* (mountain hemlock). **A22**

A22a. This mixed evergreen-deciduous forest alliance is codominated by *Populus tremuloides* (quaking aspen) and *Abies lasiocarpa* (subalpine fir) and has been described from mountain slopes and plateaus in the Rocky Mountains from Alberta, Canada, south to Montana, Wyoming, Colorado, and west into Utah.
 **A0422 Abies lasiocarpa - Populus tremuloides Rocky Mountain Moist Forest Alliance**

A22b. Vegetation is not codominated by *Populus tremuloides* (quaking aspen). **A23**

A23a. These woodlands of the subalpine Rocky Mountains are associated with talus and scree substrates and dominated by *Abies lasiocarpa* (subalpine fir) and/or *Picea engelmannii* (Engelmann spruce).
 **A3616 Abies lasiocarpa - Picea engelmannii Rocky Mountain Talus & Scree Woodland Alliance**

A23b. Site is not scree vegetated scree characterized by *Abies lasiocarpa* (subalpine fir) or *Picea engelmannii* (Engelmann spruce). **A24**

A24a. These upper montane and subalpine forests and woodlands of the northern Rocky Mountains are dominated by *Abies lasiocarpa* (subalpine fir) and/or *Picea engelmannii* (Engelmann spruce).
 **A3614 Abies lasiocarpa - Picea engelmannii Rocky Mountain Moist Forest Alliance***

A24b. These subalpine forests and woodlands of the Rocky Mountains with southern distributions are dominated by *Abies lasiocarpa* (subalpine fir) and/or *Picea engelmannii* (Engelmann spruce).
 **A3615 Abies lasiocarpa - Picea engelmannii Southern Rocky Mountain Moist Forest Alliance***

G220 Rocky Mountain Lodgepole Pine Forest & Woodland

A25a. This alliance is composed of seral forests characterized by an open to moderately closed, mixed evergreen-deciduous tree canopy that is codominated by *Populus tremuloides* (quaking aspen) and *Pinus contorta* (lodgepole pine). Stands occur on mountain slopes and plateaus in Utah, Idaho, Colorado and Wyoming.
 **A0424 Pinus contorta - Populus tremuloides Rocky Mountain Forest Alliance**

A25b. Vegetation is not codominated by *Populus tremuloides* (quaking aspen). If present, *Populus tremuloides* (quaking aspen) has low cover in the tree canopy. **A26**

A26a. This alliance is characterized by open-canopy woodlands dominated by *Pinus contorta* (lodgepole pine), rarely with other mature tree species in the canopy. Understory is typically patchy with low cover. The relatively open tree canopy (< 60% cover) is related to unusually dry or cold topo-edaphic situations such as excessively well-drained pumice deposits, shallow rocky soils with little water-holding capacity often on warm aspects, and well-drained to xeric stabilized sand dunes. It is found in mainly montane and subalpine zones of the northern Rocky Mountains and eastern Cascade Range, but extends into the southern Rocky Mountains. **A4079 Pinus contorta Rocky Mountain Woodland Alliance**

A26b. This alliance is characterized by forests primarily dominated by *Pinus contorta* (lodgepole pine). Other more shade-tolerant tree species are typically present to abundant as seedlings and saplings. Stands may be even-aged or multi-aged depending on geographic location, edaphic characteristics, and how the stands were established following wildfire. Shrub and herbaceous layers may be present or absent depending on tree canopy. It occurs in the

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upper montane and subalpine zones of the Rocky Mountains and the eastern Cascade Range.
..... **A3366 Pinus contorta Rocky Mountain Forest Alliance**

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

A27a. 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***

A27b. Vegetation is not dominated by *Picea pungens* (blue spruce).....**A28**

A28a. 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***

A28b. 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**

G225 Rocky Mountain Douglas-fir - White Fir - Blue Spruce Mesic Forest

A29a. This alliance are characterized by the dominance of *Picea pungens* in the forest canopy. *Populus tremuloides* may codominate on some sites. This forest alliance occurs at middle elevations (1800-3300 m) of the central and southern Rocky Mountains, usually in moist, concave topographic positions.
.....**A0165 Picea pungens Southern Rocky Mountain Mesic Forest Alliance***

A29b. Vegetation is not dominated by *Picea pungens* (blue spruce).....**A30**

A30a. This alliance consists of forest and woodland stands dominated by *Abies concolor* or codominated by *Populus tremuloides* or *Pseudotsuga menziesii*. They occur in mountain environments from the southern and central Rocky Mountains and east to the Wyoming Basins.
..... **A3369 Abies concolor Southern Rocky Mountain Mesic Forest & Woodland Alliance***

A30b. This alliance includes evergreen forests dominated by *Pseudotsuga menziesii* occurring on the Colorado Plateau and Rocky Mountains of Arizona, Colorado and New Mexico and may extend up into mountains in southern Wyoming.
.....**A3370 Pseudotsuga menziesii Southern Rocky Mountain Mesic Forest Alliance**

G229 Southern Rocky Mountain Ponderosa Pine Open Woodland

A31a. 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**

A31b. Only one alliance in this group

G228 Southern Rocky Mountain Ponderosa Pine Forest & Woodland

A32a. 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**

A32b. Only one alliance in this group

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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). **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. **A7**

..... **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. **A9**

..... **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). **A10**

..... **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. **A11**

..... **G250 Colorado Plateau Pinyon - Juniper Woodland***

G5b. These woodlands occur in dry mountains and foothills in southern Colorado south into northern and central New Mexico, and extend west to the Colorado Plateau and east to the plains on breaks in the southwestern Great Plains. Vegetation is characterized by an open to

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closed evergreen, conifer tree canopy composed of diagnostic species *Juniperus monosperma* (one-seed juniper) and/or *Pinus edulis* (two-needle pinyon) with an understory dominated by shrubs or grasses that lacks Madrean understory species.G6

G6a. This southern Rocky Mountain pinyon and juniper woodland group occurs in dry mountains and foothills in southern Colorado south into northern and central New Mexico, and extends west to the Colorado Plateau and east to the plains on breaks in the southwestern Great Plains. Vegetation is characterized by an open to closed evergreen, conifer tree canopy composed of dominant and diagnostic species *Pinus edulis* (two-needle pinyon) usually with *Juniperus monosperma* (one-seed juniper) or at higher elevations *Juniperus scopulorum* (Rocky Mountain juniper) present to codominant in the tree canopy and a variable understory. This Group does not occur in the Central Basin and Range ecoregion. No alliance from this group are included in key.

..... **G253 Southern Rocky Mountain Pinyon - Juniper Woodland**

G6b. This southern Rocky Mountain juniper woodland and savanna group occurs in dry mountains and foothills in southern Colorado south into northern and central New Mexico, and extends west to the Colorado Plateau and east to the plains on breaks in the southwestern Great Plains. Vegetation is characterized by an open to closed evergreen, conifer tree canopy composed of dominant and diagnostic species *Juniperus monosperma* (one-seed juniper) sometimes with or *Juniperus scopulorum* (Rocky Mountain juniper) present at higher elevations or mesic microsites to codominant in the tree canopy and a variable understory. This Group does not occur in the Central Basin and Range ecoregion. No alliance from this group are included in key.

..... **G252 Southern Rocky Mountain Juniper Open Woodland***

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

A7a. 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**

A7b. Vegetation with open to dense tree form of *Cercocarpus ledifolius* (curl-leaf mountain-mahogany). **A8**

A8a. 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**

A8b. 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**

G246 Colorado Plateau-Great Basin Juniper Open Woodland

A10a. 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**

A10b. 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

A11a. 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

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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**

A11b. 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.**A12**

A12a. 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**

A12b. 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.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.**G4**

..... **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. Foothill and montane macrogroup that occurs throughout the Central Rockies, from central and eastern Wyoming north and west into British Columbia and Alberta and is composed of shrub- and/or herbaceous-dominated stands forming shrublands, shrub-steppe, or grasslands. Characteristic shrubs include *Acer glabrum* (Rocky Mountain maple), *Amelanchier alnifolia* (Saskatoon serviceberry), *Holodiscus discolor* (oceanspray), *Menziesia ferruginea* (rusty menziesia), *Physocarpus malvaceus* (mallow ninebark), *Symphoricarpos albus* (common snowberry), *Symphoricarpos occidentalis* (western snowberry), and species of *Prunus* (plum), *Rhus* (sumac), *Ribes* (currant), *Rosa* (rose), *Rubus parviflorus* (thimbleberry), *Spiraea* (spirea), and *Vaccinium* (blueberry). The herbaceous layer is characterized by *Festuca idahoensis* (Idaho fescue), *Pseudoroegneria spicata* (bluebunch wheatgrass), and other cool-season graminoids.**G5**

..... **M048 Central Rocky Mountain Montane-Foothill Grassland & Shrubland**

M2b. Vegetation is not as above.**M3**

M3a. 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.**G7**

..... **M049 Southern Rocky Mountain Montane Shrubland**

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M3b. 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 stramineiformis* (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), *Symphotrichum* (aster) spp., *Thalictrum occidentale* (western meadowrue), and *Zigadenus elegans* (mountain deathcamas).**G8**
 **M168 Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow**

M493 Western North American Ruderal Grassland & Shrubland

G4a. This group includes ruderal shrublands and grasslands dominated by the non-native grass *Elymus repens* and other non-native grasses and shrubs and is found in disturbed valley bottoms, alluvial flats, fans and lower valley wall sites in western Colorado and northwestern Montana and elsewhere in the western US.**A9**
 **G624 Western North American Interior Ruderal Grassland & Shrubland Group**

G4b. This group is dominated by non-native invasive shrub or herbaceous species, such as *Agrostis capillaris* (colonial bentgrass), *Anthoxanthum odoratum* (sweet vernalgrass), *Cytisus scoparius* (Scotch broom), *Rubus armeniacus* (Himalayan blackberry), or many other introduced species, generally occurring on disturbed land throughout Pacific coastal areas below approximately 1500 m (5000 feet) in elevation. Not reported from NBR so no alliances are provided.
**G648 Southern Vancouverian Lowland Ruderal Grassland & Shrubland Group***

M048 Central Rocky Mountain Montane-Foothill Grassland & Shrubland

G5a. This is a dry Central Rocky Mountain shrubland group is dominated by shrubs *Amelanchier alnifolia* (Saskatoon serviceberry), *Holodiscus discolor* (oceanspray), *Physocarpus malvaceus* (mallow ninebark), *Prunus emarginata* (bitter cherry), *Prunus virginiana* (chokecherry), *Rhus glabra* (smooth sumac), *Rosa nutkana* (Nootka rose), *Rosa woodsii* (Woods' rose), *Symphoricarpos albus* (common snowberry), and/or *Symphoricarpos oreophilus* (mountain snowberry). Understory grasses and forbs are common. Stands occur across the western U.S. and Canada within the matrix of surrounding low-elevation grasslands and sagebrush shrublands of low to mid elevations of the Rocky Mountains.**A11**
 **G272 Central Rocky Mountain Montane-Foothill Deciduous Shrubland**

G5b. Vegetation is not as above. Stands are typically grasslands or meadows dominated by herbaceous species, sometimes with low shrubs such as *Arctostaphylos uva-ursi*, *Dasiphora fruticosa* ssp. *floribunda*, and *Rosa nutkana* present to codominant.**G6**

G6a. This central Rocky Mountains grassland group occurs in an upper montane to subalpine zone and is dominated by perennial grasses, particularly *Achnatherum nelsonii* (Columbia needlegrass), *Festuca idahoensis* (Idaho fescue), and *Leucopoa kingii* (spike fescue), with many other graminoid and forb species present to codominant.**A14**
 **G267 Central Rocky Mountain Montane Grassland**

G6b. This wide-ranging lower montane, foothill and valley grassland group is found in the central Rocky Mountains and extends north onto the Okanagan and Fraser plateaus, the valleys around the Fraser, Nicola, and Similkameen rivers in British Columbia, and foothills in Alberta and is dominated by cool-season perennial bunchgrasses, such as *Festuca campestris* (rough fescue), *Festuca idahoensis* (Idaho fescue), and *Pseudoroegneria spicata* (bluebunch wheatgrass) with diverse forbs (>25% cover) and sometimes a sparse (<10% cover) shrub layer.**A16**
 **G273 Central Rocky Mountain Lower Montane, Foothill & Valley Grassland**

M049 Southern Rocky Mountain Montane Shrubland

G7a. 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

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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).**A22**

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

G7b. 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).....**A25**

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

M168 Rocky Mountain-Vancouverian Subalpine-High Montane Mesic Meadow

G8a. 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 *Carices* (sedges) such as *Calamagrostis breweri* (shorthair reedgrass), *Carex filifolia* (threadleaf sedge), *Carex stramineiformis* (Shasta sedge), *Elymus trachycaulus* (slender wheatgrass), *Festuca viridula* (greenleaf fescue), and *Phleum alpinum* (alpine timothy).**A28**

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

G8b. 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).**A35**

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

G624 Western North American Interior Ruderal Grassland & Shrubland Group

A9a. 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**

A9b. This vegetation is dominated by non-native grasses rather than non-native forbs**A10**

A10a. 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**

A10b. 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 tumbled mustard), *Descurainia sophia* (herb sophia), and *Lappula occidentalis* (flatspine stickseed).

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

G272 Central Rocky Mountain Montane-Foothill Deciduous Shrubland

A11a. This shrubland alliance is characterized by the dominance of *Amelanchier alnifolia* (Saskatoon serviceberry) and is found in the lower montane and foothill regions around the northern Great Basin, Columbia Basin and central Rocky Mountains.

A3963 Amelanchier alnifolia Central Rocky Mountain Montane-Foothill Shrubland Alliance

A11b. Vegetation is not as above. *Amelanchier alnifolia* (Saskatoon serviceberry) is absent or has low cover. **A12**

A12a. This shrubland alliance is characterized by a sparse to moderately dense shrub layer dominated by *Rhus glabra* (smooth sumac) or *Rhus trilobata* (skunkbush sumac) with a sparse to moderately dense herbaceous layer composed of grasses such as *Aristida purpurea* (purple threeawn), *Festuca idahoensis* (Idaho fescue), and *Pseudoroegneria spicata* (bluebunch wheatgrass). It is found in the lower montane and foothill regions around the Columbia Basin, including river canyons, and extends north and east into the Central Rockies and to the foothills and breaks in the western Great Plains.

.... **A3964 Rhus glabra - Rhus trilobata Central Rocky Mountain Montane-Foothill Shrubland Alliance**

A12b. Vegetation is not as above. *Rhus glabra* (smooth sumac) or *Rhus trilobata* (skunkbush sumac) are absent or have low cover. **A13**

A13a. This shrubland alliance is dominated by *Rosa nutkana* (Nootka rose) with an herbaceous layer dominated by *Deschampsia caespitosa* (tufted hairgrass) or *Oenanthe sarmentosa* (water parsley). It is found in the mountains of Oregon at montane elevations.

..... **A3967 Rosa nutkana Central Rocky Mountain Shrubland Alliance**

A13b. This mesic shrubland alliance is dominated by diagnostic species *Physocarpus malvaceus* (mallow ninebark), *Rosa acicularis* (prickly rose), *Rosa nutkana* (Nootka rose), *Rosa woodsii* (Woods' rose), and/or *Symphoricarpos albus* (common snowberry). It is known from canyons of the northern Wallowa Mountains, Imnaha River, and Snake River within the Columbia Plateau, the foothills and plains of the central Rocky Mountains and ranges in the Great Basin and eastern California.

..... **A3975 Physocarpus malvaceus - Symphoricarpos albus Mesic Shrubland Alliance**

G267 Central Rocky Mountain Montane Grassland

A14a. This alliance is characterized by a sparse to moderately dense herbaceous layer dominated by diagnostic graminoid *Leucopoa kingii* (spike fescue) with *Carex elynoides* (blackroot sedge), *Oxytropis campestris* (field locoweed), *Phlox pulvinata* (cushion phlox), or *Poa fendleriana* ssp. *fendleriana* (muttongrass) present to codominant. It occurs on windward exposures on broad, gentle alpine slopes and ridges of the Challis Volcanics and Beaverhead Mountains in east-central Idaho and similar high subalpine sites in northwestern Wyoming.

..... **A1323 Leucopoa kingii - Carex elynoides - Phlox pulvinata Central Rocky Mountain Subalpine-Alpine Grassland Alliance**

A14b. Vegetation is not as above. *Leucopoa kingii* is absent or has low cover. **A15**

A15a. This alliance is characterized by a sparse to moderately dense herbaceous layer dominated by the diagnostic perennial bunchgrass *Festuca idahoensis* (Idaho fescue) with *Carex obtusata* (obtuse sedge), *Carex scirpoidea* (northern singlespike sedge), *Danthonia intermedia* (timber oatgrass), *Eriogonum caespitosum* (matted buckwheat), *Leucopoa kingii* (spike fescue), or *Potentilla diversifolia* (varileaf cinquefoil) codominating. It is described from dry and often rocky subalpine and lower alpine slopes exposed to desiccating winds in the central Rocky Mountains of central and southern Idaho, western and south-central Montana, and northwestern Wyoming.

..... **A3965 Festuca idahoensis - Carex scirpoidea - Danthonia intermedia Central Rocky Mountain Subalpine Dry Grassland Alliance**

A15b. This alliance is characterized by a moderately dense to dense and diverse herbaceous layer dominated by medium-tall perennial graminoids *Achnatherum nelsonii* (Columbia needlegrass), *Calamagrostis rubescens* (pinegrass), *Carex hoodii* (Hood's sedge), *Deschampsia caespitosa* (tufted hairgrass), or *Festuca idahoensis* (Idaho fescue) with *Achnatherum richardsonii* (Richardson's needlegrass), *Carex filifolia* (threadleaf sedge), *Elymus trachycaulus* (slender wheatgrass), *Koeleria macrantha* (prairie Junegrass), or perennial forb *Lupinus sericeus* (silky lupine) present to codominant. It is described from relatively mesic sites on montane slopes in the central Rocky Mountains of central and southern Idaho, western and south-central Montana, eastern Oregon, Washington and northwestern Wyoming.

A3966 Festuca idahoensis - Calamagrostis rubescens - Achnatherum nelsonii Central Rocky Mountain Montane Mesic Grassland Alliance

G273 Central Rocky Mountain Lower Montane, Foothill & Valley Grassland

- A16a.** This alliance is characterized by a sparse to moderately dense herbaceous layer dominated by the medium-tall perennial graminoid *Elymus lanceolatus* (thickspike wheatgrass) with *Hesperostipa comata* (needle-and-thread) or *Phacelia hastata* (silverleaf phacelia) present to codominant and occurs in the Centennial Valley Sandhills in southwestern Montana, a high and cold valley on open, sandy flats in the Columbia River plains.....
..... **A3985 Elymus lanceolatus - Hesperostipa comata - Phacelia hastata Central Rocky Mountain Sand Deposit Grassland Alliance**
- A16b.** Vegetation is not as above. *Elymus lanceolatus* (thickspike wheatgrass) is absent or has low cover. **A17**
- A17a.** Vegetation is characterized by an open to dense, usually patchy dwarf-shrub layer dominated by *Arctostaphylos uva-ursi* (kinnikinnick) or an open to moderately dense short-shrub layer dominated by *Dasiphora fruticosa ssp. floribunda* (shrubby-cinquefoil). **A18**
- A17b.** Vegetation is characterized by herbaceous cover ranging from 60-100% codominated by diagnostic perennial bunchgrasses *Festuca campestris* (rough fescue), *Festuca idahoensis* (Idaho fescue), *Pseudoroegneria spicata* (bluebunch wheatgrass), and/or *Poa secunda* (Sandberg bluegrass). Shrubs are typically absent or present with low cover. **A19**
- A18a.** This central Rocky Mountain alliance is characterized by an open to dense, usually patchy dwarf-shrub layer dominated by *Arctostaphylos uva-ursi* (kinnikinnick) with a sparse to moderately dense cover of perennial graminoids dominated by *Festuca campestris* (rough fescue), *Festuca idahoensis* (Idaho fescue), or *Pseudoroegneria spicata* (bluebunch wheatgrass). It occurs in the subalpine and lower alpine zones mountains of northwestern Montana and southwestern Alberta.
..... **A4095 Arctostaphylos uva-ursi / Festuca spp. - Pseudoroegneria spicata Steppe Alliance**
- A18b.** This small-patch, shrub-steppe alliance is characterized by an open to moderately dense short-shrub layer dominated by diagnostic species *Dasiphora fruticosa ssp. floribunda* (shrubby-cinquefoil) and a moderate to dense herbaceous layer dominated by medium-tall perennial bunchgrasses *Festuca campestris* (rough fescue) and *Festuca idahoensis* (Idaho fescue). It occurs infrequently in the central Rocky Mountains and the northwestern Great Plains.....
..... **A4096 Dasiphora fruticosa ssp. floribunda / Festuca campestris - Festuca idahoensis Shrub-steppe Alliance**
- A19a.** Vegetation of this mesic grassland alliance is characterized by herbaceous cover ranging from 60-100% codominated by diagnostic perennial bunchgrasses *Festuca campestris* (rough fescue) and *Festuca idahoensis* (Idaho fescue). It occurs in the northwestern Great Plains west into the central Rocky Mountains, including the Blue Mountains of eastern Oregon and Washington. Some stands may extend up to montane and subalpine elevations.
..... **A3986 Festuca campestris - Festuca idahoensis Mesic Grassland Alliance**
- A19b.** Vegetation is not as above. *Festuca campestris* (rough fescue) is absent or has low cover...
- A20a.** This alliance is characterized by *Pseudoroegneria spicata* (bluebunch wheatgrass), *Festuca idahoensis* (Idaho fescue), and/or *Hesperostipa comata* (needle-and-thread) dominating the midgrass layer and occurs in remnants of the Palouse Prairie of southeastern Washington, Oregon and Idaho.
..... **A3989 Festuca idahoensis - Pseudoroegneria spicata Palouse Grassland Alliance**
- A20b.** Vegetation is not as above. Stands do not occur in remnants of the Palouse Prairie of southeastern Washington, Oregon and Idaho. **A21**
- A21a.** This widespread dry grassland alliance is characterized by an open to moderately dense herbaceous layer dominated by diagnostic perennial bunchgrasses *Festuca idahoensis* (Idaho fescue), *Pseudoroegneria spicata* (bluebunch wheatgrass), and/or *Poa secunda* (Sandberg bluegrass) and occurs in the northwestern Great Plains, central Rocky Mountains and interior Pacific Northwest.....
. **A3987 Festuca idahoensis - Pseudoroegneria spicata - Poa secunda Dry Grassland Alliance**
- A21b.** This mesic grassland alliance is characterized by an open to moderately dense herbaceous layer dominated by diagnostic perennial grass *Festuca idahoensis* (Idaho fescue) or *Pseudoroegneria spicata* (bluebunch wheatgrass) with mesic-site indicator species *Bromus*

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

marginatus (mountain brome), *Elymus lanceolatus* (thickspike wheatgrass), *Koeleria macrantha* (prairie Junegrass), or *Pascopyrum smithii* (western wheatgrass) and is found primarily east of the Continental Divide in foothills in northwestern Montana.
A3988 Festuca idahoensis - Pseudoroegneria spicata - Pascopyrum smithii Mesic Grassland Alliance

G277 Southern Rocky Mountain Gambel Oak - Mixed Montane Shrubland

A22a. 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*

A22b. 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.**A23**

A23a. 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***

A23b. *Quercus gambelii* (Gambel oak), and/or *Robinia neomexicana* (New Mexico locust), *Fallugia paradoxa* (Apache plume), *Ribes cereum* (wax currant), or *Rhus trilobata* (skunkbush sumac).....**A24**

A24a. This alliance of north-central New Mexico and the Mogollon Rim in north-central Arizona is characterized by shrublands dominated or codominated by *Robinia neomexicana* (New Mexico locust) with *Quercus gambelii* (Gambel oak) often present to codominant.
..... A3738 Quercus gambelii - Robinia neomexicana Shrubland Alliance*

A24b. 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

A25a. 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*

A25b. Vegetation is not as above.**A26**

A26a. This alliance is characterized by shrublands of the eastern Front Range of Colorado within canyons dominated by *Purshia tridentata* (antelope bitterbrush) or *Ribes cereum* (wax currant). **A3731 Purshia tridentata - Ribes cereum Shrubland Alliance***

A26b. Vegetation is not as above. Shrublands dominated by *Amelanchier utahensis* (Utah serviceberry), *Cercocarpus montanus* (alderleaf mountain-mahogany), *Cercocarpus intricatus* (littleleaf mountain mahogany), and/or *Quercus x pauciloba* (Wavyleaf Oak).....**A27**

A27a. This alliance is characterized by shrublands dominated or codominated by *Cercocarpus montanus* (alderleaf mountain-mahogany) and/or *Quercus x pauciloba* (Wavyleaf Oak) occurring in the southern Rocky Mountains south to the northern Chihuahuan Desert and east to the Southern Shortgrass Prairie with outlying occurrences in adjacent ecoregions.
..... A3733 Cercocarpus montanus - Quercus x pauciloba Shrubland Alliance*

A27b. This alliance is characterized by shrublands dominated by *Amelanchier utahensis* (Utah serviceberry), *Cercocarpus montanus* (alderleaf mountain-mahogany) or *Cercocarpus*

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

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

A28a. 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*

A28b. 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. **A29**

A29a. This montane mesic meadow alliance is characterized by the dominance of *Carex stramineiformis* (Shasta Sedge) or *Solidago canadensis* (Canada goldenrod) in California and Nevada. **A4119 Carex stramineiformis - Solidago canadensis Meadow Alliance***

A29b. Vegetation is not as above. *Carex stramineiformis* (Shasta Sedge) or *Solidago canadensis* (Canada goldenrod) are typically absent or have low cover. **A30**

A30a. Vegetation is mesic montane 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). **A31**

A30b. Vegetation is subalpine/alpine grasslands, meadow or turf. **A32**

A31a. 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

A31b. 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

A32a. This high-elevation grassland alliance is dominated or codominated by diagnostic species *Festuca viridula* (greenleaf fescue) with *Carex hoodii* (Hood's sedge), *Eucephalus ledophyllus* (Cascade aster), *Festuca idahoensis* (Idaho fescue), *Lupinus argenteus var. laxiflorus* (silvery lupine), or *Lupinus latifolius* (broadleaf lupine), which may form dense, continuous stands in pristine situations. It occurs in cold, dry sites throughout the Pacific Northwest extending east to the central Rocky Mountains in northern Idaho and Wyoming.
.....A1257 Festuca viridula - Carex hoodii - Lupinus spp. Subalpine Mesic Meadow Alliance*

A32b. Vegetation is not as above. *Festuca viridula* (greenleaf fescue) is typically absent or has low cover. **A33**

A33a. 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, but may occur more widely.
..... A1294 Carex filifolia Mesic Grassland Alliance*

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

A33b. Vegetation is not as above. *Calamagrostis breweri* (shorthair reedgrass) and *Calamagrostis muiriana* (reedgrass) are typically absent or have low cover.....**A34**

A34a. This high elevation meadow alliance is characterized by a moderately dense and diverse herbaceous layer with one or more of several diagnostic species to abundant such as *Carex geyeri* (Geyer's sedge), *Carex spectabilis* (showy sedge), *Chamerion angustifolium* (fireweed), *Erythronium grandiflorum* (yellow avalanche-lily), *Ligusticum grayi* (Gray's licorice-root), *Luzula glabrata* var. *hitchcockii* (Hitchcock's smooth woodrush), *Sanguisorba officinalis* (great burnet), *Valeriana sitchensis* (Sitka valerian), *Veratrum viride* (green false hellebore), and *Xerophyllum tenax* (common beargrass). It is found in subalpine meadows in the central Rocky Mountains and extends west into the Olympic Mountains and Cascade Range.....

.A3948 Valeriana sitchensis - Luzula glabrata var. hitchcockii - Xerophyllum tenax Subalpine Mesic Meadow Alliance

A34b. 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

A35a. 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

A35b. 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

D023 Central North American Grassland & Shrubland

M1a. This macrogroup is found in the central and western Great Plains from north of the U.S.-Canadian border to extreme northern Mexico. It is dominated by exotic, invasive grasses, forbs, or, in the south, deciduous shrubs. Vegetation cover and composition is variable. Common dominant species in the north include *Agropyron cristatum* (crested wheatgrass), *Bromus inermis* (smooth brome), *Bromus japonicus* (Japanese brome), *Bromus tectorum* (cheatgrass), *Elymus repens* (quackgrass) (on more moist sites), *Phleum pratense* (timothy), *Poa pratensis* (Kentucky bluegrass), and *Thinopyrum intermedium* (intermediate wheatgrass), and the shrubs *Baccharis neglecta* (Rooseveltweed), *Crataegus mollis* (downy hawthorn), *Crataegus viridis* (green hawthorn), and *Rhus lanceolata* (prairie sumac) can be common. *Gutierrezia texana* (Texas snakeweed) and *Amphiachyris dracunculoides* (prairie broomweed) are often extremely abundant on overgrazed sites in Texas. Across the range the forbs *Ambrosia* (ragweed) spp., *Artemisia absinthium* (absinthium), *Carduus nutans* (nodding plumeless thistle), *Centaurea* (knapweed) spp., *Cirsium arvense* (Canada thistle), *Convolvulus arvensis* (field bindweed), *Dipsacus fullonum* (Fuller's teasel), and *Euphorbia esula* (leafy spurge) can be common.**G4**

..... M498 Great Plains 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. This macrogroup is found from Texas to southern Canada on somewhat excessively to excessively well-drained, deep sandy to loamy sand soils and contains grasses and scattered to moderately

dense shrubs that are well-adapted to these soil conditions. *Andropogon hallii* (sand bluestem) and *Calamovilfa longifolia* (prairie sandreed) are the most common species, but other associate species include *Achnatherum hymenoides* (Indian ricegrass), *Bouteloua* (grama) spp., *Calamovilfa gigantea* (giant sandreed), *Carex inops ssp. heliophila* (sun sedge), *Hesperostipa comata* (needle-and-thread), *Panicum virgatum* (switchgrass), *Schizachyrium scoparium* (little bluestem), *Sporobolus cryptandrus* (sand dropseed), and shrubs *Artemisia filifolia* (sand sagebrush), *Artemisia cana ssp. cana* (silver sagebrush), *Prunus angustifolia* (Chickasaw plum), *Rhus trilobata* (skunkbush sumac), *Rosa arkansana* (prairie rose), *Symphoricarpos occidentalis* (western snowberry), and *Yucca glauca* (soapweed yucca) are common. Wind erosion, grazing and fire can significantly impact this macrogroup.G5

.....M052 Great Plains Sand Grassland & Shrubland

M2b. Vegetation is not as above. Stands do not occur on excessively drained, deep sandy to loamy sand soils. Diagnostic species *Andropogon hallii* (sand bluestem) and *Calamovilfa longifolia* (prairie sandreed) are typically absent, but many of the associated species occur widely.M3

M3a. The macrogroup is dominated by mixed grasses and scattered to moderately dense shrubs. It is found from northern Texas to southern Alberta across to southwest in the region between the tallgrass prairies to the east and the shortgrass prairies to the west. The most common graminoid species occurring across the range of the macrogroup include *Hesperostipa comata* (needle-and-thread) and *Pascopyrum smithii* (western wheatgrass). Northern examples are typically dominated by *Festuca* (fescue) spp., especially *Festuca hallii* (plains rough fescue), in combination with *Bouteloua gracilis* (blue grama), *Hesperostipa curtisetata* (shortbristle needle and thread), *Koeleria macrantha* (prairie Junegrass), *Pascopyrum smithii* (western wheatgrass), *Poa pratensis* (Kentucky bluegrass), and *Symphoricarpos occidentalis* (western snowberry). Southern examples are more likely to be dominated by species such as *Aristida purpurea* (purple threeawn), *Bothriochloa laguroides ssp. torreyana* (silver beardgrass), *Bouteloua curtipendula* (sideoats grama), *Schizachyrium scoparium* (little bluestem), and *Sporobolus cryptandrus* (sand dropseed). The most mesic sites can have abundant tallgrasses, especially *Andropogon gerardii* (big bluestem), *Panicum virgatum* (switchgrass), and *Sorghastrum nutans* (Indiangrass). Other common associated species include *Bouteloua gracilis* (blue grama), *Buchloe dactyloides* (buffalograss), *Carex filifolia* (threadleaf sedge), *Carex inops ssp. heliophila* (sun sedge), *Calamovilfa longifolia* (prairie sandreed), *Elymus lanceolatus* (thickspike wheatgrass), *Festuca idahoensis* (Idaho fescue), *Hesperostipa curtisetata* (shortbristle needle and thread), *Hesperostipa neomexicana* (New Mexico feathergrass), *Koeleria macrantha* (prairie Junegrass), *Muhlenbergia montana* (mountain muhly), *Nassella leucotricha* (Texas wintergrass), *Nassella viridula* (green needlegrass), *Pseudoroegneria spicata* (bluebunch wheatgrass), *Sorghastrum nutans* (Indiangrass), and *Sporobolus compositus* (composite dropseed).G6

.....M051 Great Plains Mixedgrass & Fescue Prairie

M3b. This macrogroup forms the matrix grassland in the western half of the Western Great Plains Division east of the Rocky Mountains and ranges from southeastern Wyoming and the western Nebraska panhandle south into the panhandles of Oklahoma and Texas and eastern New Mexico. The vegetation is primarily dominated by *Bouteloua gracilis* (blue grama) and *Buchloe dactyloides* (buffalograss) throughout its range, with various associated graminoid species changing depending on latitude, precipitation, soils, and management. Associated graminoids may include *Achnatherum hymenoides* (Indian ricegrass), *Aristida purpurea* (purple threeawn), *Bouteloua curtipendula* (sideoats grama), *Bouteloua hirsuta* (hairy grama), *Carex filifolia* (threadleaf sedge), *Carex inops ssp. heliophila* (sun sedge), *Eragrostis intermedia* (plains lovegrass), *Hesperostipa comata* (needle-and-thread), *Hesperostipa neomexicana* (New Mexico feathergrass), *Koeleria macrantha* (prairie Junegrass), *Muhlenbergia torreyi* (ring muhly), *Pascopyrum smithii* (western wheatgrass), *Pleuraphis jamesii* (James' galleta), *Sporobolus airoides* (alkali sacaton), and *Sporobolus cryptandrus* (sand dropseed). Although mid-height grass species may be present, especially on more mesic land positions and soils, they are secondary in importance to the sod-forming short grasses. Sandy soils have higher cover of *Hesperostipa comata* (needle-and-thread), *Sporobolus cryptandrus* (sand dropseed), and *Yucca glauca* (soapweed yucca). Scattered shrub and dwarf-shrub species may also be present. *Gutierrezia sarothrae* (broom snakeweed) is often present to codominant especially in disturbed areas. Cacti species such as cholla (*Opuntia imbricata* (tree cholla)) and prickly-pears (*Opuntia polyacantha* (plains pricklypear) and *Opuntia phaeacantha* (tulip pricklypear)) can be abundant on some sitesG7

..... M053 Western Great Plains Shortgrass Prairie

M498 Great Plains Ruderal Grassland & Shrubland

G4a. This group is found in the Great Plains from Nebraska and Colorado north where exotic grasses and forbs constitute >75% of the herbaceous cover and trees and shrubs each have

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less than 25% cover. Common abundant or dominant species include the grasses *Agropyron cristatum* (crested wheatgrass), *Agrostis gigantea* (redtop), *Agrostis stolonifera* (creeping bentgrass), *Bromus inermis* (smooth brome), *Lolium perenne* (perennial ryegrass), *Phleum pratense* (timothy), *Poa annua* (annual bluegrass), *Poa pratensis* (Kentucky bluegrass), and *Thinopyrum intermedium* (intermediate wheatgrass) and the forbs *Ambrosia* (ragweed) spp., *Cirsium arvense* (Canada thistle), *Cirsium vulgare* (bull thistle), *Euphorbia esula* (leafy spurge), and *Melilotus officinalis* (yellow sweetclover). No alliances have been developed for this Group. **G679 Northern & Central Great Plains Ruderal Grassland & Shrubland**

G4b. There is only one Group in this Macrogroup found in the key area.

M052 Great Plains Sand Grassland & Shrubland

G5a. This group is found on sandy soils across most of the Great Plains where a sparse to dense shrub cover, mostly *Artemisia filifolia* (sand sagebrush) but also *Amorpha canescens* (leadplant), *Prosopis glandulosa* (honey mesquite), *Prunus pumila var. besseyi* (western sandcherry), *Rhus trilobata* (skunkbush sumac), and *Yucca glauca* (soapweed yucca), occurs over medium-tall grasses. **A8**
..... **G069 Great Plains Sand Shrubland**

G5b. This sand prairie is most common in the north-central Great Plains but occurs in other parts of the western plains, as well. Medium and tall grasses dominate the sandy soils of this group, typically *Andropogon hallii* (sand bluestem), *Calamovilfa longifolia* (prairie sandreed), *Hesperostipa comata* (needle-and-thread), and *Panicum virgatum* (switchgrass). **A9**
..... **G068 Great Plains Sand Grassland**

G6a. This group occurs in the central Great Plains where grasslands are dominated by *Bouteloua curtipendula* (sideoats grama), *Pascopyrum smithii* (western wheatgrass), and *Schizachyrium scoparium* (little bluestem), often with tallgrass or shortgrass species present to codominant. **A10**
..... **G133 Central Great Plains Mixedgrass Prairie**

G6b. This group is widespread in the northern Great Plains and has scattered occurrences in the western Great Plains; sites are dominated by a mixture of short, medium, and tall grasses, including *Andropogon gerardii* (big bluestem), *Carex inops ssp. heliophila* (sun sedge), *Carex filifolia* (threadleaf sedge), *Nassella viridula* (green needlegrass), *Panicum virgatum* (switchgrass), *Pascopyrum smithii* (western wheatgrass), *Schizachyrium scoparium* (little bluestem), and *Sorghastrum nutans* (Indiangrass). **A13**
..... **G141 Northern Great Plains Mesic Mixedgrass Prairie**

G7a. This semi-arid shortgrass grassland group occurs in the western half of the Western Great Plains and is usually composed of *Bouteloua gracilis* (blue grama) as the dominant or codominant species with associated graminoids *Aristida purpurea* (purple threeawn), *Bouteloua curtipendula* (sideoats grama), *Bouteloua hirsuta* (hairy grama), *Buchloe dactyloides* (buffalograss), *Hesperostipa comata* (needle-and-thread), *Hesperostipa neomexicana* (New Mexico feathergrass), *Pascopyrum smithii* (western wheatgrass), *Pleuraphis jamesii* (James' galleta), *Sporobolus cryptandrus* (sand dropseed), and scattered shrubs, dwarf-shrubs and cacti. **A19**
..... **G144 Great Plains Shortgrass Prairie**

G7b. There is only one Group in this Macrogroup.

G069 Great Plains Sand Shrubland

A8a. This alliance includes *Artemisia filifolia* (sand sagebrush)-dominated shrublands occurring mostly in the western Great Plains from as far north as the Black Hills, south to the Trans-Pecos of western Texas and northern Chihuahuan Desert, extending northwest into the Colorado Plateau. These shrublands typically occur on flat, hummocky, or rolling terrain, as well as on partially stabilized dunes and sandsheets. Vegetation cover is sparse to moderately dense, with a shrub stratum approximately 1 m tall, dominated by *Artemisia filifolia* (sand sagebrush), interspersed with areas of bare substrate and scattered tall or midgrasses. **A0816 Artemisia filifolia Great Plains Sand Prairie Scrub Alliance**

A8b. This alliance includes stands of herbaceous vegetation with a sparse shrub layer growing on sandstone outcrops and sandy soils in the northwestern Great Plains. Elevations range from 1100-1850 m. Stands of this alliance contain an open to moderately dense (at least 10% cover), low-shrub layer above a species-rich herbaceous layer. Dominance of *Yucca glauca* (soapweed yucca) in shrub layer is characteristic (cover ranging from 5-15%). *Artemisia tridentata ssp. wyomingensis* (Wyoming big sagebrush) and *Artemisia cana ssp. cana* (silver sagebrush) may be present but are sparse and contribute little cover.

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..... A1540 *Yucca glauca* Prairie Scrub Alliance

G068 Great Plains Sand Grassland

- A9a.** This alliance includes herbaceous vegetation with *Andropogon hallii* (sand bluestem), occurring in the Great Plains from the United States-Canada border south to Texas. It is dominated by tall and midgrass species, with shortgrass species becoming important in the western portion of its range. *Andropogon hallii* (sand bluestem) is usually dominant or codominant..... **A1193 *Andropogon hallii* Sand Prairie Alliance***
- A9b.** This alliance, found in the northwestern Great Plains, occurs on sandy dry-mesic sites. Stands are almost exclusively found on sand deposits; a few are on coarse loams. There are two prominent vegetation layers in stands of this alliance and a moderate amount of bare ground. The tallest layer, about 0.6-1.5 m tall, is dominated by midgrasses, particularly *Calamovilfa longifolia* (prairie sandreed). ... **A1201 *Calamovilfa longifolia* Sand Prairie Alliance**

G133 Central Great Plains Mixedgrass Prairie

- A10a.** This alliance has been identified in the northern panhandle of Texas but is likely more widespread in the southwestern Great Plains. It occurs on steep talus slopes with a moderate short-shrub canopy dominated by *Rhus trilobata* (skunkbush sumac) with lesser amounts of *Dalea formosa* (featherplume), *Mimosa borealis* (fragrant mimosa), and *Yucca glauca* (soapweed yucca) and a herbaceous layer dominated by *Bouteloua curtipendula* (sideoats grama) and *Schizachyrium scoparium* (little bluestem). **A4038 *Rhus trilobata* Great Plains Shrubland Alliance***
- A10b.** Vegetation is not as above. *Rhus trilobata* (skunkbush sumac) may be present but does not dominate vegetation. *Rhus trilobata* (skunkbush sumac) is not dominant in shrub layer. **A11**
- A11a.** This alliance consists of grasslands of limestone slopes and associated seeps of the Edwards Plateau and central Oklahoma where *Muhlenbergia reverchonii* (seep muhly) is dominant or codominant..... **A4040 *Muhlenbergia reverchonii* Grassland Alliance***
- A11b.** Vegetation is not as above. *Muhlenbergia reverchonii* (seep muhly) is typically absent.. **A12**
- A12a.** This alliance is found in the southwestern Great Plains to western New Mexico where *Pascopyrum smithii* (western wheatgrass) and *Bouteloua gracilis* (blue grama) dominate in swales and valleys..... **A4039 *Pascopyrum smithii* - *Bouteloua gracilis* Great Plains Grassland Alliance**
- A12b.** This alliance is common in the central and southern Great Plains on slopes and rolling uplands where *Schizachyrium scoparium* (little bluestem) and *Bouteloua curtipendula* (sideoats grama) are dominant or codominant, possibly with a variety of other short, mid, and tallgrass species. **A4042 *Schizachyrium scoparium* - *Bouteloua curtipendula* Central Great Plains Grassland Alliance***

G141 Northern Great Plains Mesic Mixedgrass Prairie

- A13a.** Vegetation is characterized by an open to moderately dense shrub layer with grassy understory. **A14**
- A13b.** Vegetation is characterized by an open to moderately dense herbaceous layer. Scattered shrubs may be present but do not form a layer. **A17**
- A14a.** Stands of this temporarily flooded alliance occur in mesic draws and along streams in the northern Great Plains and adjacent foothills with a typically dense, tall (to 2.5 m) shrub layer that is dominated by *Crataegus douglasii* (black hawthorn) or *Crataegus succulenta* (fleshy hawthorn), either alone or together. A substantial amount of *Prunus virginiana* (chokecherry) and may include substantial amounts of *Amelanchier alnifolia* (Saskatoon serviceberry) and *Prunus americana* (American plum) may be present in the tall shrub layer..... **A0954 *Crataegus douglasii* - *Crataegus succulenta* Shrubland Alliance**
- A14b.** Vegetation is not as above. *Crataegus douglasii* (black hawthorn) and *Crataegus succulenta* (fleshy hawthorn) are typically absent. **A15**
- A15a.** This alliance is found in the northwestern Great Plains on moderate to steep slopes where short shrubs, especially *Rhus trilobata* (skunkbush sumac), are scattered in a mixedgrass prairie generally dominated by *Schizachyrium scoparium* (little bluestem) and *Carex filifolia* (threadleaf sedge). Lesser amounts of *Artemisia frigida* (prairie sagewort), *Gutierrezia*

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- sarothrae* (broom snakeweed), *Rosa arkansana* (prairie rose), and *Symphoricarpos occidentalis* (western snowberry) may be present in the shrub layer.
- ... **A1537 Rhus trilobata / Schizachyrium scoparium - Carex filifolia Shrub Grassland Alliance**
- A15b.** Vegetation is not as above. *Rhus trilobata* (skunkbush sumac) is typically absent or has low cover. **A16**
- A16a.** This alliance is found on hillslopes in the northwestern Great Plains where *Juniperus horizontalis* (creeping juniper) and *Dasiphora fruticosa ssp. floribunda* (shrubby-cinquefoil) dominate a sparse to moderate short-shrub layer mixed with moderate to dense cover of midgrasses.
- **A4035 Juniperus horizontalis - Dasiphora fruticosa ssp. floribunda / Schizachyrium scoparium Shrubland Alliance**
- A16b.** This alliance is composed of shrublands in the northern Great Plains and adjacent areas dominated by the deciduous shrubs *Amelanchier alnifolia* (Saskatoon serviceberry), *Prunus* (plum) spp., and *Symphoricarpos occidentalis* (western snowberry) with >25% cover.
- . **A4036 Prunus virginiana - Symphoricarpos occidentalis - Amelanchier alnifolia Great Plains Shrubland Alliance**
- A17a.** This alliance is found in the northern and western Great Plains on sites where moisture availability is greater than the surrounding landscape. The vegetation is characterized by a mix of tall and mid grasses within a mixedgrass landscape, commonly with *Andropogon gerardii* (big bluestem), *Bouteloua curtipendula* (sideoats grama), *Sorghastrum nutans* (Indiangrass), and *Schizachyrium scoparium* (little bluestem).
- **A4028 Andropogon gerardii - Sorghastrum nutans Mixedgrass Western Plains Grassland Alliance**
- A17b.** Vegetation is not as above. Tall grasses such as *Andropogon gerardii* (big bluestem) or *Sorghastrum nutans* (Indiangrass) are typically absent. **A18**
- A18a.** This alliance is found in the northern Great Plains on fine-textured soils in mesic settings where the mid grasses *Pascopyrum smithii* (western wheatgrass) and *Nassella viridula* (green needlegrass) are dominant or codominant.
- A4031 Pascopyrum smithii - Nassella viridula Northwestern Great Plains Grassland Alliance**
- A18b.** This alliance is found in the northwestern Great Plains on coarse- or medium-textured soils where *Schizachyrium scoparium* (little bluestem) is the dominant grass but other mid and short grasses and sedges can be abundant, particularly *Bouteloua curtipendula* (sideoats grama), *Bouteloua gracilis* (blue grama), *Carex inops ssp. heliophila* (sun sedge), and *Carex filifolia* (threadleaf sedge).
- **A4034 Schizachyrium scoparium Northwestern Great Plains Grassland Alliance**
- G144 Great Plains Shortgrass Prairie**
- A19a.** This dwarf-shrubland alliance is composed of a variety of shrubs, such as *Artemisia frigida* (prairie sagewort), *Dalea formosa* (featherplume), *Gutierrezia sarothrae* (broom snakeweed), *Mimosa borealis* (fragrant mimosa), and/or *Yucca glauca* (soapweed yucca), and occurs in the shortgrass steppe of the western Great Plains in a variety of environments but is common in shallow soils near escarpments.
- . **A3999 Artemisia frigida - Dalea formosa - Gutierrezia sarothrae Dwarf-shrubland Alliance***
- A19b.** Vegetation is not as above. Shrubs and dwarf-shrubs are typically absent or have low cover. **A20**
- A20a.** This mixedgrass alliance is characterized by a moderately dense grass layer of midgrass *Hesperostipa neomexicana* (New Mexico feathergrass) with a shortgrass layer composed of codominant *Bouteloua gracilis* (blue grama) and/or *Bouteloua hirsuta* (hairy grama). It is found from the northern Chihuahuan Desert north into the southwestern Great Plains on gentle to moderately steep slopes in foothills and escarpments.
- **A4002 Bouteloua gracilis - Bouteloua hirsuta - Hesperostipa neomexicana Shortgrass Prairie Alliance***
- A20b.** Vegetation is not as above. The midgrass *Hesperostipa neomexicana* (New Mexico feathergrass) is typically absent or has low cover. **A21**
- A21a.** This shortgrass alliance is characterized by a moderate to dense sod of short grasses *Bouteloua gracilis* (blue grama) and *Buchloe dactyloides* (buffalograss) on semi-arid prairies and is common across the western portions of the Great Plains.
- **A4000 Bouteloua gracilis - Buchloe dactyloides Shortgrass Prairie Alliance**

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A21b. This shortgrass prairie alliance is characterized by a moderate to dense layer of short grasses dominated by *Bouteloua gracilis* (blue grama), *Bouteloua hirsuta* (hairy grama), and midgrass *Bouteloua curtipendula* (sideoats grama) with *Buchloe dactyloides* (buffalograss) absent or has low cover. It is common across the western portions of the central and southern Great Plains.
.... A4001 Bouteloua gracilis - Bouteloua hirsuta - Bouteloua curtipendula Shortgrass Prairie Alliance

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, scree 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**

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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).**G13**
..... **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).**G15**
..... **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).**A16**
..... **G600 Great Basin-Intermountain Ruderal Dry Shrubland & Grassland**

G7b. Vegetation is not as above. Shrublands, shrub-steppe or grasslands stands with invasive, exotic species present to dominant, but stand is not converted beyond the point where one cannot determine original natural plant community because of conversion by non-native species to novel disturbed vegetation type. **M2**

M095 Great Basin-Intermountain Xeric-Riparian Scrub

G8a. Sparsely to densely vegetated shrublands that occur along dry watercourses that experience periodic flash flooding. Not currently reported from Wyoming but likely occurs there.**A21**
..... **G559 Great Basin-Intermountain Shrub & Herb Wash-Arroyo**

G8b. Vegetation is not as above. There is only one group in this macrogroup.**M3**

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.**A22**

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

..... **G570 Intermountain Basins Cliff, Scree & Badland Sparse Vegetation**
G9b. Vegetation is not as above. There is only one group in this macrogroup. **M4**

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. **A25**

..... **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. **A32**

..... **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 *Krascheninnikovia lanata* (winterfat). **A33**

..... **G311 Intermountain Semi-Desert Grassland**

G12b. 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), *Krascheninnikovia lanata* (winterfat), *Mahonia fremontii* (Fremont's mahonia), *Opuntia polyacantha* (plains pricklypear), and *Tetradymia canescens* (spineless horsebrush) with or without an herbaceous layer. **A39**

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

M169 Great Basin-Intermountain Tall Sagebrush Steppe & Shrubland

G13a. 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). **A47**

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

- **G304 Intermountain Mountain Big Sagebrush Steppe & Shrubland**
- G13b.** 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..... **G14**
- G14a.** 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..... **A50**
- **G303 Intermountain Dry Tall Sagebrush Steppe & Shrubland**
- G14b.** 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)..... **A52**
- **G302 Intermountain Mesic Tall Sagebrush Steppe & Shrubland**
- M170 Great Basin-Intermountain Dwarf Sagebrush Steppe & Shrubland**
- G15a.** 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..... **A55**
- **G308 Intermountain Low & Black Sagebrush Steppe & Shrubland**
- G15b.** This Columbia Plateau group forms extensive low shrublands dominated by diagnostic dwarf-shrubs, *Artemisia rigida* (scabland sagebrush), *Salvia dorrii* (purple sage), and/or diagnostic 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). **G307 Columbia Plateau Scabland Dwarf-shrubland***
- G600 Great Basin-Intermountain Ruderal Dry Shrubland & Grassland**
- A16a.** Vegetation is dominated by woody vegetation **A17**
- A16b.** Vegetation is dominated by herbaceous vegetation..... **A18**
- A17a.** 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**
- A17b.** 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**
- A18a.** Vegetation is dominated by herbaceous annual species. **A19**
- A18b.** Vegetation is dominated by herbaceous perennial species..... **A20**
- A19a.** 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**

A19b. 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**

A20a. 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**

A20b. 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 triumphettii* (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

A21a. 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**

A21b. Currently there is only a single alliance in this Group.

G570 Intermountain Basins Cliff, Scree & Badland Sparse Vegetation

A22a. 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**

A22b. Vegetation consists of various shrubs. **A23**

A23a. This sparsely vegetated alliance (<10% vascular cover) has varied characteristic species such as *Enceliopsis nudicaulis* (nakedstem sunray), *Eriogonum brevicaulis* (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**

A23b. Site is not badlands of shales, siltstones or mudstones on typically rounded hills and plains..... **A24**

A24a. 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*

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(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**

A24b. 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

A25a. 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***

A25b. Vegetation is not characterized *Artemisia pygmaea* (pygmy sagebrush). **A26**

A26a. This low scrub alliance are dominated by the halophytic, evergreen dwarf-shrub *Atriplex corrugata* (mat saltbush) and found on lower hillslopes and alkaline flats on the Colorado Plateau portions of northwestern New Mexico, western Colorado and Utah.....

..... **A1109 Atriplex corrugata Low Scrub Alliance***

A26b. Vegetation is not characterized *Atriplex corrugata* (mat saltbush). **A27**

A27a. 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**

A27b. 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.....

..... **A1127 Artemisia pedatifida 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). Other shrubs are species of Mojavean or Great Basin affinities may be present to codominant, however species of *Atriplex* (saltbush) are typically absent or have very low cover. Stands occur 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 scrub alliance is dominated or codominated by *Atriplex obovata* (mound saltbush) or *Atriplex cuneata* (valley saltbush) that occurs in the northern Chihuahuan Desert and Colorado Plateau from western Texas, south-central and northwestern New Mexico, and northeastern Arizona..... **A3180 Atriplex obovata - Atriplex cuneata Scrub Alliance**

A30b. Vegetation is characterized by *Atriplex canescens* (fourwing saltbush), *Atriplex confertifolia* (shadscale saltbush) and/or *Picrothamnus desertorum* (bud sagebrush). *Grayia spinosa* (spiny hopsage) may be present to codominant. **A31**

A31a. 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*

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tridentata (big sagebrush), *Ephedra viridis* (mormon-tea), or *Krascheninnikovia lanata* (winterfat) may codominate..... **A0869 Atriplex canescens Scrub Alliance**

A31b. 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

A32a. 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**

A32b. 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

A33a. 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**

A33b. Vegetation is dominated by an herbaceous layer largely composed of perennial grasses. **A34**

A34a. 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**

A34b. Vegetation is not dominated or codominated by *Achnatherum speciosum* (desert needlegrass). If present, this grass has very low cover. **A35**

A35a. 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**

A35b. 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. **A36**

A36a. 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. **A37**

A36b. 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).....**A38**

A37a. 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**

A37b. 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**

A38a. 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**

A38b. 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

A39a. Vegetation is a shrubland and shrub steppe dominated by species of *Chrysothamnus* (rabbitbrush) or *Ericameria* (goldenbush).**A40**

A39b. 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.....**A44**

A40a. Vegetation is dominated by *Chrysothamnus albidus* (whiteflower rabbitbrush) or *Chrysothamnus viscidiflorus* (yellow rabbitbrush) shrubs.....**A41**

A40b. Vegetation is dominated by *Ericameria nauseosa* (rubber rabbitbrush), *Ericameria parryi* (Parry's rabbitbrush) or *Ericameria teretifolia* (green rabbitbrush) shrubs.**A42**

A41a. 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**

A41b. 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**

A42a. 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**

A42b. Vegetation not dominated by *Ericameria teretifolia* (green rabbitbrush).....**A43**

A43a. 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**
A43b. 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**

A44a. This alliance represents vegetation of the interior western U.S. characterized by a sparse to dense layer of *Krascheninnikovia lanata* (winterfat).....

..... **A3202 *Krascheninnikovia lanata* Steppe & Dwarf-shrubland Alliance**
A44b. Vegetation is not characterized by *Krascheninnikovia lanata* (winterfat) shrubs **A45**

A45a. 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**
A45b. Vegetation is not characterized by *Glossopetalon spinescens* (spiny greasebush). **A46**

A46a. 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**

A46b. 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**

G304 Intermountain Mountain Big Sagebrush Steppe & Shrubland

A47a. Vegetation is dominated or codominated by *Artemisia tridentata* (big sagebrush) **A48**

A47b. Vegetation is dominated by other species of *Artemisia* (sagebrush) **A49**

A48a. 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**

A48b. 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**

A49a. 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**

A49b. 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).....

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

.....**A3200 Artemisia cana ssp. bolanderi - Artemisia cana ssp. viscidula** Steppe & Shrubland Alliance

G303 Intermountain Dry Tall Sagebrush Steppe & Shrubland

A50a. 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

A50b. Vegetation is not dominated by *Artemisia tridentata ssp. tridentata* (basin big sagebrush) or *Artemisia tridentata ssp. xericensis* (big sagebrush).....**A51**

A51a. 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

A51b. 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

A52a. 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

A52b. Vegetation is not characterized by an open to moderately dense short-shrub layer dominated or codominated by *Purshia tridentata* (antelope bitterbrush).....**A53**

A53a. 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

A53b. Vegetation is not characterized by an open to moderately dense shrub layer dominated or codominated by *Artemisia tripartita* (threetip sagebrush).**A54**

A54a. 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

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

- 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**
- A54b.** 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

- A55a.** Vegetation dominated or codominated by varieties of *Artemisia arbuscula* (little sagebrush) **A56**
- A55b.** Vegetation dominated by *Artemisia bigelovii* (Bigelow sage), *Artemisia nova* (black sagebrush), and/or *Artemisia frigida* (prairie sagewort). **A59**
- A56a.** 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**
- A56b.** Vegetation not dominated by *Artemisia arbuscula ssp. arbuscula* (little sagebrush). **A57**
- A57a.** 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**
- A57b.** Vegetation is not dominated by *Artemisia arbuscula ssp. longicaulis* (Lahontan sagebrush).
- A58a.** 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**
- A58b.** 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**
- A59a.** 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**
- A59b.** Vegetation is not dominated or codominated by *Artemisia nova* (black sagebrush). **A60**
- A60a.** 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**
- A60b.** 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**

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

D051 Eastern North American Temperate & Boreal Cliff, Scree & Rock Vegetation

M1a. This sparsely vegetated cliff, bluff, and rock outcrop Macrogroup is found in the Great Plains from the U.S.-Canadian border area south to Texas. It is defined by having sparse vascular vegetation, cryptograms and an abundance of exposed bedrock. The bedrock exposure can be vertical, sloping, or horizontal along rivers, at the tops of buttes, in dry canyons, or, rarely, large, low bedrock outcrops. The bedrock is usually sedimentary (sandstone, limestone, shale, gypsum, siltstone), but granite, rhyolite and (rarely) quartzite also occur. Vegetation is generally sparse except where soil accumulates in pockets or ledges. Dominant species vary greatly depending on geology of the bedrock, climate, aspect, slope, and slope position. Lichens predominate on exposed rock. Common vascular species found in this macrogroup are able to tolerate the dry to xeric conditions and poor soil development. These include *Bouteloua eriopoda* (in the southwest), *Bouteloua gracilis*, *Bouteloua hirsuta*, *Bouteloua rigidiseta*, *Cercocarpus montanus*, *Erioneuron pilosum*, *Juniperus spp.*, *Opuntia spp.*, *Rhus trilobata*, and *Vulpia octoflora* (= *Festuca octoflora*).**G2**

.....**M116 Western North American Cliff, Scree & Rock Vegetation**

M1b . This badlands vegetation macrogroup occurs in the northern Great Plains of the United States and Canada and may extend west into the Wyoming Basin Ecoregion. The sparse vegetation is a mix of shrubs, forbs, and grasses with each characterizing some areas. There is typically zonation of vegetation from the top of a slope to the bottom with different groups of species most common in certain zones. Typical species found in Great Plains badlands are the shrubs *Artemisia cana*, *Artemisia longifolia*, *Artemisia tridentata*, *Atriplex spp.*, *Eriogonum flavum*, *Eriogonum pauciflorum*, *Gutierrezia sarothrae*, *Juniperus horizontalis*, and *Sarcobatus vermiculatus*. Forbs include *Iva axillaris*, among others. Graminoids, though uncommon, include *Pseudoroegneria spicata*, and, in saline seepages, *Distichlis spicata* (= *Distichlis stricta*). Examples are found on slopes above rivers or streams, with erodible clay and poorly consolidated shale interspersed with sandstone, lignite lenses, and occasional scoria outcrops.**G3**

..... **M115 Great Plains Badlands Vegetation**

M116 Western North American Cliff, Scree & Rock Vegetation

G2a. This cliff, bluff, and rock outcrop group from the Great Plains from the U.S.-Canadian border area south to Texas and is defined by having sparse vegetation and the abundance of exposed bedrock. The bedrock exposure can be vertical, sloping, or horizontal along rivers, at the tops of buttes, in dry canyons, or, rarely, large, low bedrock outcrops. Vegetation is generally sparse except where soil accumulates in pockets or ledges.....**A4**

.....**G567 Great Plains Cliff, Scree & Rock Vegetation**

G2b. There is only one Group in this macrogroup.

M115 Great Plains Badlands Vegetation

G3a. This badland vegetation group from the Northern Great Plains of the United States and Canada and occurs on slopes of easily erodible clay and poorly consolidated shale interspersed with sandstone, lignite lenses, and occasional scoria outcrops. Vegetation cover is typically sparse but can be moderate in small patches with shallower slopes. The dominant vegetation is a mix of shrubs, forbs and grasses with each dominating some areas.**A5**

..... **G566 Great Plains Badlands Vegetation**

G3b. There is only one Group in this macrogroup.

G567 Great Plains Cliff, Scree & Rock Vegetation

A4a. This sparsely vegetated alliance occurs bluffs and cliffs of limestone or dolostone in the central and northern Great Plains. Species vary from site to site but may include the shrubs *Rhus trilobata* (skunkbush sumac) and *Rosa arkansana* (prairie rose), the forbs *Mentzelia decapetala* (tenpetal blazingstar), *Eriogonum pauciflorum* (fewflower buckwheat), *Gutierrezia sarothrae* (broom snakeweed), and the grasses *Schizachyrium scoparium* (little bluestem) and *Achnatherum hymenoides* (Indian ricegrass). Soils are generally absent or poorly developed or limited to cracks and ledges..... **A3980 Great Plains Alkaline Cliff Alliance**

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

A5aThis sparsely vegetated alliance of bluffs and cliffs of sandstone or siltstone in the central and northern Great Plains. Vascular floristic diversity is low. Forbs such as *Mentzelia decapetala* (tenpetal blazingstar) and *Penstemon glaber* (sawsepal penstemon) tend to be more abundant than other lifeforms. Scattered shrubs, such as *Rhus trilobata* (skunkbush sumac) and *Cercocarpus montanus* (alderleaf mountain-mahogany), and grasses, such as *Pseudoroegneria spicata* (bluebunch wheatgrass) and *Bouteloua gracilis* (blue grama), which

are more common in the surrounding grasslands and shrub communities can also occur. In general, slopes in this alliance are steep to vertical but small areas with gentle slopes or flat ledges can occur. Soils are absent or poorly developed and limited to cracks or ledges.

- **A3981 Great Plains Acidic Cliff Alliance**
- A5b.** This alliance consists of outcrops of acidic bedrock in the central and northern Great Plains with one disjunct site in central Wisconsin. Species vary widely across the range of this alliance but typically consist of Great Plains taxa that can tolerate the shallow, dry soils. Total vegetation cover is sparse across the outcrops but can be moderate or even dense in small pockets where soil accumulates. Substrate varies from granite and quartzite (in Minnesota and Wisconsin) to siltstone, sandstone, shale, and even pockets of gypsum. The outcrops are generally flat to moderately sloping but soil development is limited to cracks or depressions.
- **A3982 Great Plains Acidic Rock Outcrop Alliance***

G566 Great Plains Badlands Vegetation

- A6a.** This alliance is found in the Badlands regions of the northwestern Great Plains on weakly consolidated sedimentary rocks, where eroded slopes contain interbedded clay and silt shales. Stands have a sparse to moderate woody layer (15-40% cover) dominated by the deciduous, facultative halophytic shrub *Sarcobatus vermiculatus* (greasewood).
- **A3978 Sarcobatus vermiculatus Great Plains Badlands Alliance**
- A6b.** Vegetation is not as above. *Sarcobatus vermiculatus* (greasewood) is typically absent. **A7**
- A7a.** This alliance is known from northeastern Colorado on hot, dry sites such as exposed siltstone barrens and ravines on convex slopes where erosion is active and moisture penetration is minimal. Stands have a sparse, short herbaceous layer of mostly perennial, mat-forming cushion plants, particularly *Arenaria hookeri* (Hooker's sandwort), and a few grasses. **A1642 Arenaria hookeri Rock Alliance**
- A7b.** Vegetation is not as above. *Arenaria hookeri* (Hooker's sandwort) is typically absent. **A8**
- A8a.** This vegetation is known from badlands in the northwestern Great Plains on moderately to steeply sloping acid-shale barrens and clay with sparse to moderate cover by forbs, especially *Artemisia longifolia* (longleaf wormwood) with *Eriogonum pauciflorum* (fewflower buckwheat) sometimes codominating. **A1874 Artemisia longifolia Badlands Alliance**
- A8b.** This alliance contains sparsely vegetated, forb-dominated communities on badland landscapes in the northwestern Great Plains on clays, shales, and poorly consolidated sandstones or conglomerates or on the colluvial slopes at the base of such slopes. Rapid erosion prevents the development of soils and this along with the arid climate limit vegetation development to 1-10% cover. Consistent species in this alliance are *Eriogonum pauciflorum* (fewflower buckwheat) and *Gutierrezia sarothrae* (broom snakeweed).
- **A3979 Eriogonum pauciflorum - Gutierrezia sarothrae Badlands Alliance**

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**

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

- G2b.** These groups 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**

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

Key to USNVC Wetland and Riparian Macrogroups, Groups and Alliances in the Wyoming Basin Ecoregion

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.

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*

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

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. **A4**

..... **G510 Interior West Ruderal Riparian Forest & Scrub**

G2b. There is only one group in this macrogroup.....

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). **A7**

..... **G797 Western Interior Riparian Forest & Woodland**

G3b. The other group in this macrogroup does not occur in the Wyoming Basin 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. 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**

A6b. 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**

G797 Western Interior Riparian Forest & Woodland

A7a. 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**

A7b. 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***

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

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

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.

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 elevationsG4

G3b. Wetlands dominated by herbaceous species.G6

G4a. Wetlands at high altitudes. The following 3 groups occur within MG075. They are found at high altitudes; they are listed here for information, but are not keyed, nor are their alliances.

..... **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), *Oplanax 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 oblongifolia* (Arizona 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.A19

..... **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.....**A22**
 **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.....

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

- **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 **A16**
- A15a.** *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**
- A15b.** Sublpinne 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**
- A16a.** 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**
- A16b.** Shrublands not dominated by *Salix eastwoodiae* (mountain willow) and/or *Salix lemmonii* (Lemmon's willow). **A17**
- A17a.** 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**
- A17b.** 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**
- G524 Western North American Ruderal Marsh, Wet Meadow & Shrubland**
- A18a.** 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**
- A18b.** Vegetation not like above in all respects. **A19**
- A19a.** 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). **A20**
- A19b.** Vegetation not like above in all respects. **A21**
- A20a.** 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**

A20b. 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

A21a. 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

A21b. 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

A22a. Bulrush or cattail marshes**A23**
A22b. Lower stature marshes dominated by other taxa.**A24**

A23a. 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* (panicked bulrush). Sites flooded (on average 1 m deep) for most of the growing season.
.. A3895 Schoenoplectus americanus - Schoenoplectus acutus - Schoenoplectus californicus Marsh Alliance

A23b. 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

A24a. 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**
A24b. Vegetation not like above in all respects.....**A25**

A25a. 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

A25b. 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**

D033 North American Great Plains Saline Marsh

M1a. Graminoid-dominated saline shallow depressions and mudflats dominated by *Distichlis spicata*, *Hordeum jubatum*, *Pascopyrum smithii*, or *Salicornia rubra*, as well as other flood- and saline-tolerant species. It occurs throughout the Great Plains from southern Canada to the panhandle of Texas and west into the plains of Montana, Wyoming and Colorado.**G2**
..... M077 Great Plains Saline Wet Meadow & Marsh

M1b. This is the only macrogroup in this division.

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

M077 Great Plains Saline Wet Meadow & Marsh

G2a. Alkaline grasslands with and without a shrub layer with dominant grasses that include *Distichlis spicata* (saltgrass), *Muhlenbergia porteri* (bush muhly), *Panicum obtusum* (vine-mesquite), *Puccinellia nuttalliana* (Nuttall's alkaligrass), *Scleropogon brevifolius* (burrograss), and/or *Sporobolus airoides* (alkali sacaton), and found in the Great Plains and Rocky Mountain foothills. Stands have a high water table because of land position and impermeable subsurface horizons. Soils are moderately saline and usually alkaline. **A3**

..... **G534 Western Great Plains Saline Wet Meadow**

G2b. Wet saline meadows further east, not like above in all respects.....
..... **G324 Great Plains Saline Wet Meadow & Marsh***

G534 Western Great Plains Saline Wet Meadow

A3a. Stands with high herbaceous cover and widely spaced shrubs. Dominant herbaceous species include *Distichlis spicata* (saltgrass), *Grindelia squarrosa* (curlycup gumweed), *Hordeum jubatum* (foxtail barley), *Pascopyrum smithii* (western wheatgrass), *Plantago* (plantain) spp., *Puccinellia nuttalliana*, *Salicornia rubra*, and/or *Symphyotrichum ericoides* (white heath aster). The very open and widely spaced shrub layer is dominated by *Artemisia frigida* (prairie sagewort), *Artemisia tridentata* (big sagebrush), and/or *Sarcobatus vermiculatus* (greasewood). Total vegetation cover can be low to moderate and abundant bare soil can be common. Soils are often alkaline. This alliance occurs in the northern and western Great Plains and Rocky Mountain foothills.

..... **A3905 Sarcobatus vermiculatus Great Plains Wet Shrubland Alliance**

A3b. *Sporobolus airoides* (alkali sacaton)-dominated or -codominated grasslands. The vegetation is characterized by a sparse to moderately dense graminoid layer of medium-tall bunchgrasses with smaller densities of short grasses and forbs. Widely scattered (<10% cover) xeromorphic or halophytic shrubs and dwarf-shrubs may also be present. This grassland alliance occurs in the western and southern Great Plains. Stands occur in a wide variety of lowland sites, such as stream terraces, swales, interdune basins, and alluvial flats. ...

..... **A3904 Sporobolus airoides Great Plains Marsh Alliance**

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

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). **A5**

..... **G538 North American Desert Alkaline-Saline Marsh & Playa**

G537 North American Desert Alkaline-Saline Wet Scrub

A3a. 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**

A3b. Stands not dominated by *Sarcobatus vermiculatus* (greasewood). **A4**

- A4a.** 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**
- A4b.** 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***

G538 North American Desert Alkaline-Saline Marsh & Playa

- A5a.** 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**
- A5b.** Vegetation not like above in all respects.....**A6**
- A6a.** 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)**A7**
- A6b.** 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**
- A7a.** *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**
- A7b.** Vegetation not like above in all respects.....**A8**
- A8a.** 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**
- A8b.** 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**

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