

Field Key to Ecological Systems and Target Alliances of the Northern Rocky Mountains, United States

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Introduction

The following keys to NatureServe ecological systems and selected US-NVC vegetation alliances cover the areas found in NLCD map zones: 10, 19, 21 (the Northern Rocky Mountains). The systems and alliances included in these keys are intended to represent the legend that LANDFIRE will be striving to map for existing vegetation in the northern Rockies (Figure 1). Some types are in the keys that characteristically occur at small spatial scales (generally <2 ha in size) and hence may not be mappable by the LANDFIRE project. However, we have chosen to be inclusive in the keys, so that the user will have information on these system types for comparison purposes. In some cases they may be important for modeling fire condition class and, given their relative distinctiveness on the landscape, they may indeed be mappable.

Plant names are almost always in Latin and follow the nomenclature of Kartesz (1999). In limited cases, we have included synonyms for some taxa.

The keys are “dichotomous”, which means the user follows the order of the ‘couplets’ and makes a choice between the 2 options represented in the couplet. The ordering of the couplets

in each key does matter, and the user should choose the option in each couplet that best fits the data or field situation. A choice leads the user to the next couplet to be utilized in the keying process, via a number at the far right, or else leads to a final result (an ecological system type or an alliance).

If the choice the user makes leads to a “result”, then either an Ecological System is named or a Vegetation Alliance is named. Alliances are recognizable because “alliance” is in the name, and they all start with one or more Latin names (e.g. *Pinus ponderosa* Woodland Alliance).

Systems do not include Latin species names in them, and always start with a Biogeographic region (e.g. Columbia Plateau Steppe and Grassland). If an ecological system is followed by a number in parentheses, then the couplet so numbered is to alliances that are part of the system and which may be mappable.

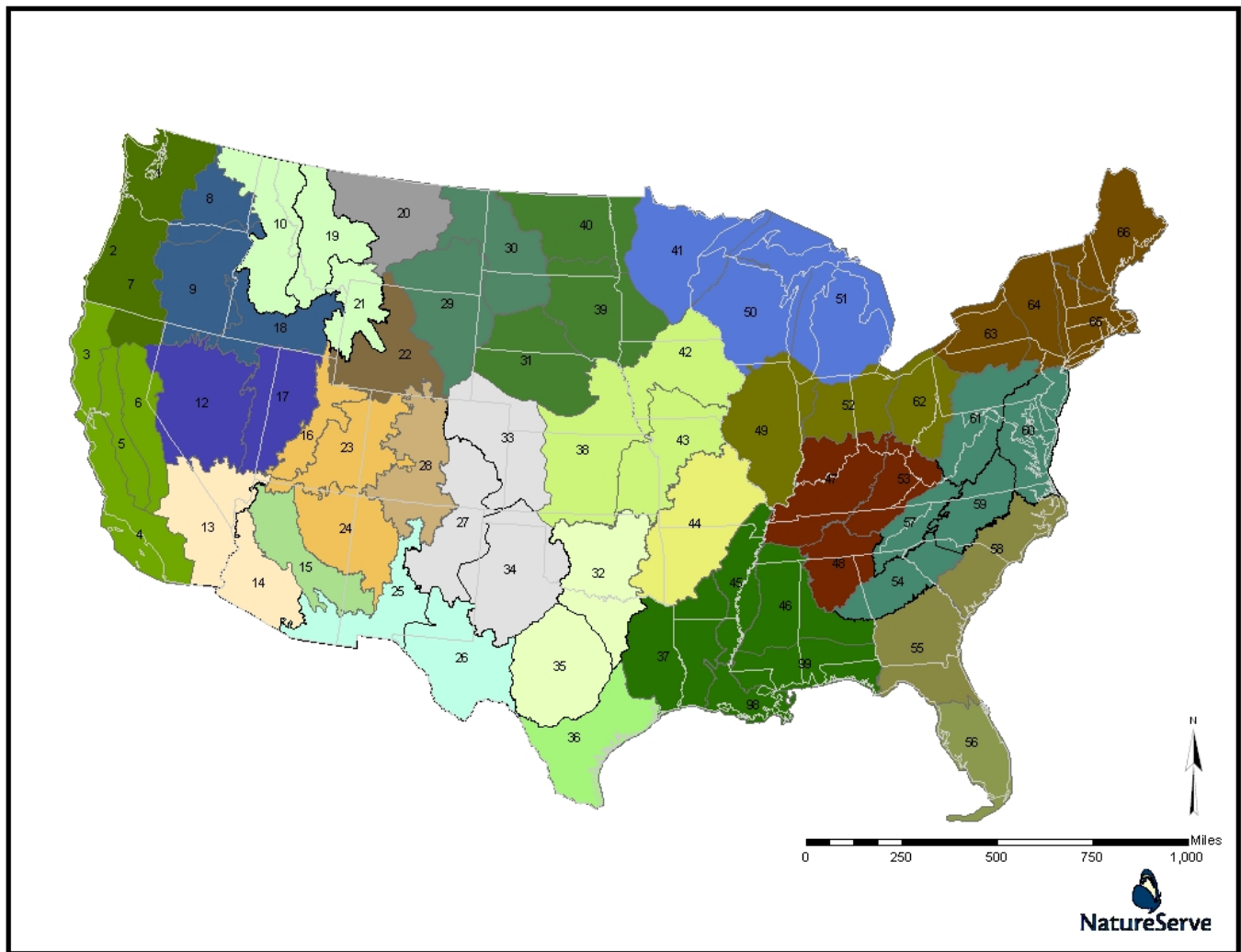


Figure 1. LANDFIRE map zone clusters with keys to ecological systems and selected alliances.

All the keys follow the same logic. First the user determines if the vegetation (or land cover) is 'sparse'; if not then you go to Key A and are lead into riparian or wetland woodlands or shrublands, then to upland deciduous forest/woodlands, then to upland coniferous forests/woodlands, then savannas, then shrublands and shrub-steppe. The second section of each key (Key B) is for the herbaceous systems and alliances, and keys through wetland/riparian situations first.

Keys are generally based on dominance within vegetation strata, with tree cover generally considered first, then that of shrubs, then the herbaceous component. Codominant species within a given strata are important as well, in some cases a system type or alliances will have 2 or more codominant species, which may or may not be present in all stands. Many ecological systems will have a variable physiognomy; where appropriate these variable systems have been placed into the keys in several places (i.e. some grassland systems have a "shrub-steppe" physiognomy and hence will be in the key both as shrub-steppe and herbaceous). Some terminology is commonly employed throughout the keys that distinguish general spatial characteristics of the vegetation or environmental setting. For example 'matrix' types of

vegetation are dominant across the majority of a given landscape, while ‘large patch’ types tend to occur as distinctive patches within the larger ‘matrix.’ Elevation-based life zones are commonly employed, with reference to ‘alpine,’ ‘subalpine,’ ‘montane,’ or ‘foothill’ zones. These zones vary in actual elevational thresholds across multiple map zones, and within individual map zones. More precise definition of these elevation breaks by map zone could be accomplished with additional research.

In the next section of the document we have provided a table showing the LANDFIRE legend units that represent non-natural vegetation and a short description for each of them. They are not formally incorporated into the keys, since they are typically recognizable without the use of a key, or else their floristic composition is so variable as to be not useful in a field key. Our primary purpose was to provide keys for the natural and near-natural vegetation of these zones.

Land Use, Unvegetated, Semi-natural and Altered Vegetation

LAND USE OR UNVEGETATED SURFACES	
Open Water	Open water
Developed	Generally developed lands.
Developed, Open Space	Vegetation (primarily grasses) planted in developed settings for recreation, erosion control, or aesthetic purposes. Impervious surfaces account for less than 20% of total cover. Examples include parks, lawns, golf courses, airport grasses, and industrial site grasses.
Developed, Low Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-50% of total cover. These areas most commonly include single-family housing units.
Developed, Medium Intensity	Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-80% of the total cover. These areas most commonly include single-family housing units
Developed, High Intensity	Includes highly developed areas where people reside in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100% of the total cover.
Agriculture	Generally developed for agricultural uses.
Pasture/Hay	These agriculture lands typically have perennial herbaceous cover (e.g. regularly-shaped plantings) used for livestock grazing or the production of hay. There are obvious signs of management such as irrigation and haying that distinguish it from natural grasslands. Identified CRP lands are included in this land cover type.
Cultivated Crops and Irrigated Agriculture	These areas used for the production of crops, such as corn, soybeans, small grains, sunflowers, vegetables, and cotton, typically on an annual cycle. Agricultural plant cover is variable depending on season and type of farming. Other areas include more stable land cover of orchards and vineyards.
Perennial Ice/Snow	
SEMI-NATURAL / ALTERED VEGETATION	
Ruderal Vegetation	Vegetation resulting from succession following significant anthropogenic disturbance of an area. It is generally characterized by unnatural combinations of species (primarily native species, though they often contain slight or substantial numbers and amounts of species alien to the region as well)
Ruderal Upland - Old Field	
Ruderal Upland - Abandoned Tree Plantation	
Ruderal Wetland	
Introduced Vegetation	Vegetation dominated by introduced species. These are spontaneous, self-perpetuating, and not (immediately) the result of planting, cultivation, or human maintenance. Land occupied by introduced vegetation is generally permanently altered (converted) unless restoration efforts are undertaken.
Introduced Upland Vegetation -	Land cover is significantly altered/disturbed by introduced tree species.

Treed	
Introduced Upland Vegetation - Shrub	Land cover is significantly altered/disturbed by introduced woody and/or herbaceous vegetation.
Introduced Upland Vegetation - Annual and Biennial Forbland	Land cover is significantly altered/disturbed by introduced annual and biennial forbs. Natural vegetation types are no longer recognizable. Typical species that dominate these areas are <i>Acroptilon repens</i> , <i>Leucanthemum vulgare</i> , <i>Cirsium arvense</i> , <i>C. vulgare</i> , <i>Euphorbia esula</i> , <i>Lepidium latifolium</i> , <i>Carduus nutans</i> , <i>Centaurea</i> spp. (<i>diffusa</i> , <i>solstitialis</i>), <i>Salsola kali</i> , <i>Bassia scoparia</i> , <i>Halogeton glomeratus</i> , <i>Melilotus officinalis</i> , and <i>Cardaria</i> spp.
Introduced Upland Vegetation – Annual Grassland	Land cover is significantly altered/disturbed by introduced annual grasses. Natural vegetation types are no longer recognizable. Typical species include <i>Bromus japonicus</i> , <i>B. rigidus</i> , <i>B. rubens</i> , <i>B. tectorum</i> , <i>Taeniatherum caput-medusae</i> , and/or <i>Schismus barbatus</i> .
California Annual Grassland	Land cover dominated by introduced, non-native annual grasses within the central valley and coastal portions of California. Natural vegetation types are no longer recognizable. Grass and forb species include <i>Bromus</i> spp. (e.g., <i>madritensis</i> , <i>diandrus</i> , <i>hordeaceus</i>), <i>Eschscholzia californica</i> , <i>Aira caryophyllea</i> , <i>Lasthenia</i> spp., <i>Castilleja</i> spp., <i>Avena</i> spp., <i>Mesembryanthemum</i> , <i>Malephora</i> , and/or <i>Carpobrotus</i> , commonly referred to as 'iceplant.' The native shrubs <i>Ambrosia chamissonis</i> , <i>Eriogonum latifolium</i> , and/or <i>Abronia latifolia</i> may be present as emergents. <i>Poa douglasii</i> may also be present.
Introduced Upland Vegetation - Perennial Grassland and Forbland	Land cover is significantly altered/disturbed by introduced, non-native perennial grasses and forbs. Natural vegetation types are no longer recognizable. Grass species include <i>Agropyron cristatum</i> , <i>Poa bulbosa</i> , <i>Bromus inermis</i> , <i>Phleum pratense</i> , and <i>Poa pratensis</i> . Forbs may include: <i>Centaurea</i> spp., <i>Cirsium arvense</i> , <i>Euphorbia esula</i> , <i>Lepidium</i> spp., <i>Melilotus</i> spp.
Introduced Riparian Vegetation	Land cover is altered/disturbed and dominated by introduced woody vegetation (woodlands and shrublands). Typical riparian trees and shrubs include <i>Elaeagnus angustifolia</i> , <i>Tamarix</i> spp., <i>Triadica sebifera</i> , etc.
Introduced Wetland Vegetation	Land cover is altered/disturbed and dominated by introduced wetland vegetation. Species may include <i>Lythrum salicaria</i> , <i>Phalaris arundinacea</i> , <i>Phragmites australis</i> , etc.
Modified/Managed Vegetation	Vegetation resulting from management or modification of natural/near natural; vegetation, but producing a structural and floristic combination not clearly known to have a natural analogue. Modified vegetation may be easily restorable by either management, restoration of ecological processes, and/or succession.
Modified/Managed Upland Vegetation	Land cover is apparently managed/modified and dominated by trees and/or shrubs. Vegetation is a mixture of herbaceous, shrub, and tree species.
Recently Burned Forest and Woodland	Land cover is apparently modified by recent fires which have burned forest and woodland vegetation. Vegetation is a mixture of herbaceous, shrub, and tree species.
Recently Burned Shrubland	Land cover is apparently modified by recent fires which have shrubland vegetation. Vegetation is a mixture of herbaceous and shrub species.
Recently Burned Grassland	Land cover is apparently modified by recent fires which have burned grassland vegetation. Vegetation is a mixture of herbaceous and shrub species.
Managed Tree Plantation	Land cover is apparently modified and appears as a managed tree plantation.
Recently Logged Timberland	Land cover is apparently modified and appears as logged timberland.
Modified/Managed Wetland Vegetation	These areas include created and obviously managed wetlands of varying size resulting from water diversion. Artificial Wetlands will be mapped where obvious built structures may be distinguished from imagery.

Northern Rocky Mountain Region Ecological Systems and Target Alliances

This key is intended for identifying Ecological Systems and selected alliances that are found in the Middle and Northern Rocky Mountains from the Teton and Wind River ranges in northwest Wyoming north and west into central and northern Idaho and northwestern Montana (Landfire Map Zones 10, 19, 21). Additional alliance couplets are to proposed mappable or target alliances and are not intended to be comprehensive.

Please note the following symbols:

* indicates NS ecological system that has been grouped into broader LANDFIRE Map Unit. Included to help clarify key, but crews need to record broader LANDFIRE Map Unit(**)

** indicates broader LANDFIRE Map Unit.

*** small patch ecological system, NOT being mapped by LANDFIRE.

**** This alliance is not considered mappable, but is included as a counter-point to one that is mappable.

- 1a. Total woody canopy cover generally 10% or more
 **GO TO KEY A: Woodland, Savanna, Shrub-Steppe, or Shrubland Systems and Alliances**
- 1b. Total woody canopy cover generally less than 10%2
- 2a. Total canopy cover generally 10% or more.....**GO TO KEY B: Herbaceous Systems and Alliances**
- 2b. Total canopy cover generally less than 10% or annual herbaceous cover dominates vegetation.....
 **Sparse Vegetation 3**
- 3a. Barren and typically sparsely vegetated alpine substrates.....4
- 3b. Barren and sparsely vegetated substrates NOT alpine6

SPARSELY VEGETATED (<10% vascular cover)

- 4a. Land cover is ice or exposed rock (usually >90% cover of either bedrock, boulders or scree).....5
- 4b. Land cover has significant amounts (10-50% cover) of vascular herbaceous vegetation (typically dominated by cushion plants) and exposed gravels and rock outcrop (50-90% cover). Sites typically occur on upper slopes and ridges and are windswept by prevailing winds so that snow does not remain long.
 **Rocky Mountain Alpine Fell field**
- 5a. Land cover is mostly exposed rock (usually >90% cover of either bedrock, boulders or scree). Nonvascular cover (lichens) may be significant..... (Rocky Mountain Alpine Bedrock and Scree*)
 **Rocky Mountain Alpine/Montane Sparsely Vegetated Systems****
- 5b. Land cover is ice or permanent snowfield.....**North American Alpine Ice Field**
- 6a. Land cover is bottomland or drainages7
- 6b. Land cover is upland dune, mudstone or shale badlands, volcanic rock outcrop or cinder sites, or escarpments or canyons.....8
- 7a. Land cover is a restricted to drainages with a variety of sparse or patchy vegetation including *Sarcobatus vermiculatus*, *Ericameria nauseosa*, *Artemisia cana*, *Artemisia tridentata* or *Grayia spinosa*. Herbaceous vegetation such as perennial grasses, *Distichlis spicata* or *Sporobolus airoides*, may also dominate wash.
 **Inter-Mountain Basins Wash*****
- 7b. Site is a barren to sparsely vegetated playa that is intermittently flooded and may remaining dry several years at a time. Soil is typically saline with surface crust of evaporate. Species are typically halophytes such as *Allenrolfea occidentalis*, *Sarcobatus vermiculatus*, *Distichlis spicata*, and *Atriplex* spp. May not occur in the mapping area. (Inter-Mountain Basins Playa) *
 **Inter-Mountain Basins Sparsely Vegetated Systems ****

8a. Land cover is non-volcanic, consolidated rock (cliffs, outcrops).....	9
8b. Land cover is volcanic or unconsolidated material	10
9a. Land cover is largely exposed bedrock and scree that is widespread across the intermountain western US from foothill to subalpine elevations (outside the Colorado Plateau Region). It occurs at below montane zone (1800m) where along western edge of the Rocky Mountain Cordillera	
..... (Inter-Mountain Basins Cliff and Canyon*)	
..... Inter-Mountain Basins Sparsely Vegetated Systems**	
9b. Land cover is largely exposed bedrock and scree found in the Rocky Mountains (generally above 1800m) elevation.	
..... (Rocky Mountain Cliff, Canyon and Massive Bedrock*)	
..... Rocky Mountain Alpine/Montane Sparsely Vegetated Systems**	
10a. Land cover is volcanic in origin (includes lava, cinder, ash deposits)	11
10b. Land cover is upland dune, mudstone or shale badlands, NOT sparsely vegetated volcanic substrate.....	12
11a. Volcanic substrates (generally <10% plant cover) such as basalt lava (malpais), basalt dikes with associated colluvium, basalt cliff faces and uplifted "backbones," cinder cones or cinder fields.	
..... (Inter-Mountain Basins Volcanic Rock and Cinder Land*)	
..... Inter-Mountain Basins Sparsely Vegetated Systems**	
11b. Highly eroded volcanic ash and tuff. Landforms are typically rounded hills and plains that form a rolling topography. Restricted to western portions of MZ 21 and southern portions of MZ 10 and 19.....	
..... (Columbia Plateau Ash and Tuff Badland*)	
..... Inter-Mountain Basins Sparsely Vegetated Systems**	
12a. Land cover is active and/or partially vegetated (stabilized) dunes or sand sheets.....	
..... (Inter-Mountain Basins Active and Stabilized Dune*)	
..... Inter-Mountain Basins Sparsely Vegetated Systems**	
12b. Land cover is NOT dunes or sand sheets	13
13a. Land cover is eroded shale or clay hills (may not occur in the northern portions of the MZ 10 and 19	
..... (Inter-Mountain Basins Shale Badland*)	
..... Inter-Mountain Basins Sparsely Vegetated Systems**	
13b. Land cover is barren, but not as above (review land use and disturbed classes)	
..... (Undifferentiated Barren*)	
..... Northern Rocky Mountain Sparsely Vegetated Systems**	

KEY A (Middle and Northern Rocky Mountain): Woodland, Savanna, Shrub-Steppe or Shrubland Ecological Systems and Mappable Alliances
(Woody cover >10% cover present)

RIPARIAN WOODLAND AND SHRUBLANDS

1a. Land cover is restricted to drainages, semi-riparian flats, riparian areas, springs or seeps (flat, depressional or slope) and areas with high water tables.....	2
1b. Land cover is upland vegetation without seeps or areas with high water tables	10
2a. Higher elevation woodlands and shrublands generally >2500m elevation (upper montane-subalpine-alpine).....	3
2b. Middle and lower elevation woodlands and shrublands generally <2500m elevation (lower montane to valley floor).....	5
3a. High elevation woodlands	4
3b. High elevation shrublands. Stands restricted to drainages, stream terraces, semi-riparian flats and spring or seep fed slopes. Can be quite swampy or boggy. Species of <i>Salix</i> , <i>Alnus</i> or <i>Betula</i> are commonly present	
..... (Rocky Mountain Subalpine - Montane Riparian Shrubland*)	
..... Rocky Mountain Subalpine/Upper Montane Riparian Systems**	

- 4a. Well drained soils of drainages, stream terraces, semi-riparian flats and spring or seep fed slopes. If dominated by conifers than site is well drained, soils that may remain wet seasonally, but are rarely saturated year-round, never boggy or anoxic.....
..... **(Rocky Mountain Subalpine - Montane Riparian Woodland*)**
..... **Rocky Mountain Subalpine/Upper Montane Riparian Systems****
- 4b. Poorly drained soils saturated year-round or with seasonal flooding in the spring. These are primarily on flat to gently sloping lowlands, but also occur up to near the lower limits of continuous forest (below the subalpine parkland). Soils are poorly drained, mucky areas, and areas are often a mosaic of moving water and stagnant water. Soils can be woody peat, muck or mineral but tend toward mineral.
..... **Northern Rocky Mountain Conifer Swamp**
- 5a. Woodlands and shrublands restricted to drainages and semi-riparian flats that are dominated by the introduced species *Elaeagnus angustifolia* or *Tamarix* spp. **6**
- 5a. Woodlands and shrublands restricted to drainages and semi-riparian flats that are not dominated by the introduced species *Elaeagnus angustifolia* or *Tamarix* spp. **7**
- 6a. Woodlands restricted to drainages and semi-riparian flats that are dominated by introduced *Elaeagnus angustifolia*.....(*Elaeagnus angustifolia* **Semi-Natural Woodland Alliance***)
..... **Invasive Riparian Woodland and Shrubland****
- 6b. Woodlands and shrublands restricted to drainages and semi-riparian flats that are dominated by introduced *Tamarix* spp..... (*Tamarix* spp. **Semi-Natural Temporarily Flooded Shrubland Alliance***)
..... **Invasive Riparian Woodland and Shrubland****
- 7a. Lower montane – foothill woodlands and shrublands restricted to drainages, semi-riparian flats and spring or seep fed slopes; generally reliant on perennial source of water **8**
- 7b. Lower elevation areas, lower foothills to primarily valley bottom shrublands restricted to temporarily flooded drainages and flats **11**
- 8a. Lower montane and foothill riparian woodlands and shrublands associated with mountain ranges of northern Rocky Mountains (Map Zones 10 &19) and Cascades. Woodlands are often dominated by *Populus balsamifera* ssp. *trichocarpa*. Several other tree can be mixed in the canopy, including *Populus tremuloides*, *Betula papyrifera*, *Betula occidentalis*, *Picea mariana*, and *Picea glauca*. Shrub understory components include *Cornus sericea*, *Acer glabrum*, *Alnus incana*, *Betula papyrifera*, *Oplonanax horridus*, and *Symphoricarpos albus*. Ferns and forbs of mesic sites are commonly present in many occurrences, including such species as *Athyrium filix-femina*, *Gymnocarpium dryopteris*, and *Senecio triangularis*. Riparian forest stands are maintained by annual flooding and hydric soils throughout the growing season and are often accompanied by riparian shrublands or open areas dominated by wet meadows
..... **(Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland*)**
..... **Rocky Mountain Montane Riparian Systems ****
- 8b. Not as above..... **9**
- 9a. Lower montane and foothill riparian woodlands and shrublands associated with mountain ranges of the southern and central Rocky Mountains (includes Map Zone 21 and possibly southeastern portion of Map Zone 19). Woodlands are often dominated by *Populus angustifolia*, but may include *Picea pungens*, *Populus tremuloides*, *Pseudotsuga menziesii*, *Alnus incana*, and *Cornus sericea*. *Populus balsamifera* ssp. *trichocarpa* typically absent or has low cover. Riparian forest stands are maintained by annual flooding and hydric soils throughout the growing season and are often accompanied by riparian shrublands or open areas dominated by wet meadows **(Rocky Mountain Lower Montane Riparian Woodland and Shrubland*)**
..... **Rocky Mountain Montane Riparian Systems ****
- 9b. Lower elevation riparian areas and seeps in the foothills and canyons along streams along the western edge of the Rocky Mountains **10**

- 10a. Lower elevation riparian areas and seeps in the foothills and canyons along streams within the Columbia River Basin at and below lower tree line on the western portions of Map Zones 10 and 19. Distinguishing species include *Alnus rhombifolia*, *Alnus rubra*, *Betula occidentalis*, *Crataegus douglasii*, *Celtis laevigata* var. *reticulata*, *Frangula purshiana*, *Fraxinus*, *Pinus monticola*, *Pinus ponderosa*, *Philadelphus lewisii*, *Populus balsamifera* ssp. *trichocarpa*, *Populus fremontii*, *Populus acuminata*, *Pseudotsuga menziesii*, *Salix amygdaloides*, *Salix eriocephala*, *Salix exigua*, *Salix lasiolepis*, *Salix lemmonii*, *Salix lucida* ssp. *lasiandra*, and *Salix lutea* (Columbia Basin Foothill Riparian Woodland and Shrubland **)
..... Inter-Mountain Basins Montane Riparian Systems*
- 10b. Sagebrush dominated stream terraces and other low areas with high water tables at least part of the year. *Artemisia cana* ssp. *bolanderi* or *Artemisia cana* ssp. *viscidula* are dominant with *Artemisia tridentata* ssp. *tridentata*, *Artemisia tridentata* ssp. *wyomingensis*, or *Artemisia tridentata* ssp. *vaseyana* occasionally codominant. Columbia Plateau Silver Sagebrush Seasonally Flooded Shrub-Steppe***
- 11a. Open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus*. Stands are widespread in the Intermountain Basins region but restricted to dry valley bottoms in the Rocky Mountains. *Atriplex canescens*, *Atriplex confertifolia*, or *Krascheninnikovia lanata* may be present to codominant with patches of *Distichlis spicata* grasslands. Commonly occurs on saline/alkaline plains and basins, sometimes encircling playas or on stream terraces..... Inter-Mountain Basins Greasewood Flat
- 11b. Open to moderately dense shrublands dominated by one or more species of *Atriplex* and/or *Krascheninnikovia lanata*. *Sarcobatus vermiculatus* is absent or has low cover. Other shrubs present to codominant include *Artemisia tridentata* ssp. *wyomingensis*. Typical of saline basins, alluvial slopes and plains across the Intermountain western U.S. extending into the Great Plains, but restricted to valley bottoms in Middle and Northern Rocky Mountains, such as the valleys on the edges of the Wyoming Basins Inter-Mountain Basins Mixed Salt Desert Scrub

FORESTS, WOODLANDS AND WOODED STEPPES

- 12a. Upland forests and woodlands (trees generally with >25% cover)13
- 12b. Upland savannas (10-25% cover of trees, generally >3 m tall with a single main stem and >25% cover graminoids), shrublands and shrub-steppe (10-25% cover of shrubs and >25% cover graminoids).....35
- 13a. Broadleaf forests and woodlands or mixed conifer-broadleaf forests and woodlands (deciduous trees make up 25-100% of the tree canopy).14
- 13b. Conifer forests and woodlands (deciduous trees may make up less than 25% cover of the tree canopy).....18

Broadleaf Deciduous Forests and Woodlands

- 14a. Broadleaf forests and woodlands or mixed conifer-aspen forests and woodlands (deciduous trees make up 25-100% of the tree canopy).16
- 14b. *Populus tremuloides* not present, broadleaf forest or woodland (or shrubland) dominated by *Acer grandidentatum* or *Cercocarpus ledifolius*15
- 15a. Broadleaf forest or woodland (or really tall shrublands) dominated by *Acer grandidentatum*, often occurs in a ravine or draw and is generally restricted to southern Idaho portion of Map Zones 10 & 19.
..... Rocky Mountain Bigtooth Maple Ravine Woodland
- 15b. Broadleaf forest, woodland or shrubland dominated by *Cercocarpus ledifolius* that form low stature woodland and shrublands dominated by *Cercocarpus ledifolius*. Stands often occurs as small patches in forested landscapes. *Artemisia tridentata* ssp. *vaseyana*, *Purshia tridentata*, with species of *Arctostaphylos*, *Ribes*, or *Symphoricarpos* are often present. **Note:** If you can key to subspecies: *Cercocarpus ledifolius* var. *intercedens* often occur as small trees 4-5 m and form a woodland whereas *Cercocarpus ledifolius* var. *ledifolius* typically occur only as shrublands to 1.5 m tall.....
..... Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland

16a. Broadleaf forest or woodland typically dominated by <i>Populus tremuloides</i> (and possible inclusions of other broadleaf tree species) with less than 25% total tree canopy cover of conifers.....	17
16b. Mixed conifer-broadleaf forests and woodlands codominated by <i>Populus tremuloides</i> and conifer trees with 25-75% relative tree canopy of each canopy type. These mixed stands will commonly occur in relatively small areas	Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland
17a. Broadleaf forest or woodland typically dominated by <i>Populus tremuloides</i> . Common associates are <i>Betula papyrifera</i> and <i>Populus balsamifera</i> with an understory of mixed grass species and tall shrubs. More poorly drained sites may contain willow (<i>Salix</i> spp.) and sedges (<i>Carex</i> spp.). This system is considered part of the boreal-mixed grass prairie grassland transition region, but may occur at lower elevations on the northeastern edge of Map Zone 19 (northern Rocky Mountain Front). Fire constitutes the most important dynamic in this system and prevents boreal conifer species such as <i>Picea glauca</i> and <i>Abies balsamea</i> from becoming too established in this system.....	Northwestern Great Plains Aspen Forest and Parkland
17b. Broadleaf forest or woodland typically dominated by <i>Populus tremuloides</i> (and possible inclusions of other broadleaf tree species) with less than 25% total tree canopy cover of conifers. It is widespread throughout the Rocky Mountain region.....	Rocky Mountain Aspen Forest and Woodland
18a. Subalpine conifer forests, woodlands or parklands	19
18b. Montane and foothills conifer forests and woodlands.....	24

Subalpine Conifer Forests and Woodlands

19a. Stunted tree clumps, open woodlands, and herb- or dwarf-shrub-dominated openings, occurring above closed forest ecosystems and below alpine communities. Stands are dominated by <i>Pinus albicaulis</i> , <i>Larix lyallii</i> and/or <i>P. flexilis</i>	20
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20b. Tree clumps and woodlands dominated by <i>Pinus flexilis</i>	Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland
21a. Conifer forests and woodlands strongly dominated by <i>Pinus contorta</i> . <i>Populus tremuloides</i> , <i>Abies lasiocarpa</i> and <i>Picea engelmannii</i> may be present, but are generally <25% of tree canopy.....	22
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22a. Subalpine forests, occasionally found in the montane zone where the dominance of <i>Pinus contorta</i> (>2/3 total tree canopy) is related to topo-edaphic conditions and nutrient-poor soils, such as excessively well-drained pumice deposits, glacial till and alluvium on valley floors where there is cold-air accumulation, warm and droughty shallow soils over fractured quartzite bedrock, and shallow moisture-deficient soils with a significant component of volcanic ash.....	Rocky Mountain Poor Site Lodgepole Pine Forest
22b. Conifer forests and woodlands are strongly dominated by <i>Pinus contorta</i> (>2/3 total tree canopy), but site characteristics not as above. Stands are typically early to mid-seral forest on productive soils. These are subalpine forests where the dominance of <i>Pinus contorta</i> is related to fire history and topo-edaphic conditions. Following stand-replacing fires, <i>Pinus contorta</i> will rapidly colonize and develop into dense, even-aged stands. This system includes <i>Pinus contorta</i> -dominated stands that, while typically persistent for >100-year time frames, may succeed to spruce-fir forests and woodlands in the central and northern Rocky Mountains.....	Rocky Mountain Lodgepole Pine Forest
23a. Matrix subalpine conifer forests and woodlands of relatively dry subalpine environments that are widespread in the Rocky Mountain Region; <i>Abies lasiocarpa</i> and <i>Picea engelmannii</i> are the major canopy components, but other trees can include <i>Pseudotsuga menziesii</i> and <i>Pinus contorta</i>	Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland

- 23b. Large and small patch subalpine conifer forests and woodlands characterized by relatively mesic local environments (such as north aspect toe slopes). Mesic understory species can include shrubs such as *Vaccinium membranaceum*, *Amelanchier alnifolia*, *Rubus parviflorus*, *Ledum glandulosum*, *Phyllodoce empetrifomis*; forbs *Actaea rubra*, *Maianthemum stellatum*, *Cornus canadensis*, *Erigeron eximius*, *Gymnocarpium dryopteris*, *Saxifraga bronchialis*, *Tiarella* spp., *Lupinus arcticus* ssp. *subalpinus*, *Valeriana sitchensis*, and graminoids *Luzula glabrata* var. *hitchcockii* or *Calamagrostis canadensis*.....
 **Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland**

Montane and Foothills Conifer Forests and Woodlands

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Montane Forests and Woodlands

- 25a. Conifer forests and woodlands strongly dominated by *Pinus contorta* and sometimes codominated by *Populus tremuloides***26**
 25b. Conifer forests and woodlands NOT dominated by *Pinus contorta*, but may be present with low cover.....**27**

- 26a. Conifer forests and woodlands strongly dominated by *Pinus contorta* (>2/3 total tree canopy) sometimes with *Populus tremuloides* codominating. These subalpine forests are occasionally found in the montane zone, where the dominance of *Pinus contorta* is related to topo-edaphic conditions and nutrient-poor soils. These include excessively well-drained pumice deposits, glacial till and alluvium on valley floors where there is cold-air accumulation, warm and droughty shallow soils over fractured quartzite bedrock or with a significant component of volcanic ash.**Rocky Mountain Poor Site Lodgepole Pine Forest**

- 26b. Conifer forests and woodlands strongly dominated by *Pinus contorta* (>2/3 total tree canopy), but not with above site characteristics. These are upper montane to subalpine forests where the dominance of *Pinus contorta* is related to fire history and topo-edaphic conditions. Stands are typically early to mid-seral forests on productive soils. Following stand-replacing fires, *Pinus contorta* will rapidly colonize and develop into dense, even-aged stands. This system includes *Pinus contorta*-dominated stands that, while typically persistent for >100-year time frames, may succeed to Douglas-fir forests and woodlands in the central Rocky Mountains. **Rocky Mountain Lodgepole Pine Forest**

- 27a. Conifer forests dominated by *Pinus ponderosa*. May have inclusions of *Pseudotsuga menziesii* woodlands on cool aspects. *Populus tremuloides* may be present, but is generally <25% of tree canopy.**28**
 27b. Conifer forests and woodlands dominated by *Abies grandis*, *Picea pungens*, or *Pseudotsuga menziesii*, and sometime codominated by *Pinus ponderosa* and/or *P. contorta*. *Populus tremuloides* may be present, but is generally <25% of tree canopy.....**29**

- 28a. Woodland to Savanna (open canopy) is (or could be) maintained by fire. *Pinus ponderosa* is the dominant canopy component. May have inclusions of *Pseudotsuga menziesii* woodlands on cool aspects. *Populus tremuloides* may be present, but is generally <25% of tree canopy. This is the predominant ponderosa pine system in Map Zones 10 and 19 **Northern Rocky Mountain Ponderosa Pine Woodland and Savanna**

- 28b. Matrix *Pinus ponderosa* dominated woodlands sometimes with inclusions of *Pseudotsuga menziesii* woodlands on cool aspects. *Pinus flexilis*, *Juniperus* spp. or *Populus tremuloides* may also be present. Stands are widespread in foothills and mountains in the in the southern and central Rocky Mountains including Map Zone 21, and extends out on to breaks in the western and northwestern plains (eastern edge of Map Zone 19)..... **Southern Rocky Mountain Ponderosa Pine Woodland**

- 29a. Mesic Mixed Forests dominated by *Abies grandis*, *Tsuga heterophylla*, *Thuja plicata*, and *Picea engelmannii*. *Pseudotsuga menziesii* commonly share the canopy, and *Pinus monticola*, *Pinus contorta*, *Abies grandis*, *Taxus brevifolia*, and *Larix occidentalis* are major associates. Mesic *Abies grandis* associations are included in this system, and *Abies grandis* is often the dominant in these situations; *Tsuga heterophylla* and *Thuja plicata* can both be absent. Key mesic understory species include *Asarum caudatum*, *Clintonia uniflora*, *Coptis occidentalis*, *Prosartes*, *Gymnocarpium dryopteris*, *Tiarella trifoliata*,

- Trientalis borealis* ssp. *latifolia*, *Trillium ovatum*, *Viola glabella*. This montane forest occurs in relatively mesic land positions and cooler aspects in Map Zones 10 & 19
..... **Northern Rocky Mountain Mesic Montane Mixed Conifer Forest (33)**
- 29b. Forests not as above **30**
- 30a. Dry Mixed Forests dominated by *Pseudotsuga menziesii* and *Pinus ponderosa* (but there can be one without the other) and other typically seral species, including *Pinus contorta*, *Pinus monticola*, *Larix occidentalis*, and *Abies grandis*. Lacking the key mesic understory species listed above. This is the predominant montane forest in Map Zones 10 & 19
..... **Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest (33)**
- 30b. Forests not as above **31**
- 31a. Montane conifer forests and woodlands often occurs at the lower tree line immediately above valley grasslands, or sagebrush steppe and shrublands in the Middle Rocky Mountains such as the Wind River Range and Absaroka Mountains. *Pseudotsuga menziesii* typically dominates, occasionally with *Pinus flexilis* on calcareous substrates, and *Pinus contorta* at higher elevations. True firs, such as, *Abies lasiocarpa* are absent. Understory components include shrubs such as *Physocarpus malvaceus*, *Juniperus communis*, *Symphoricarpos oreophilus*, and *Mahonia repens*, and graminoids such as *Calamagrostis rubescens*, *Carex rossii*, and *Leucopoa kingii*. This is the predominant montane forest in Map Zone 21
..... **Middle Rocky Mountain Montane Douglas-fir Forest and Woodland (33)**
- 31b. Forests not as above **32**
- 32a. Matrix mixed-conifer forests and woodlands characteristic of relatively dry montane environments that are widespread in the southern Rocky Mountain Region, and extends into southeastern Idaho. Canopy dominants are *Pseudotsuga menziesii*, *Pinus contorta*, and *Pinus flexilis*. This is the montane forest may occur in the southern and western portions of Map Zone 21
..... **Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland (33)**
- 32b. Large and small patch mixed-conifer forests and woodlands typical of relatively mesic local environments (such as north aspect toe slopes), often with mesic species in the understory. *Pseudotsuga menziesii* is the canopy dominant; understory species include *Acer glabrum*, *Acer grandidentatum*, *Alnus incana*, *Betula occidentalis*, *Bromus ciliatus*, *Cornus sericea*, *Luzula* sp., *Osmorhiza* sp., *Physocarpus malvaceus*, *Populus tremuloides*, *Robinia neomexicana*, *Salix* sp., *Sorbus scopulina*, *Thalictrum* sp., *Vaccinium membranaceum*, *Vaccinium myrtillus*. This is the montane forest may occur in the southern and western portions of Map Zone 21
..... **Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland (33)**
- 33a. Conifer forests and woodlands dominated or codominated by *Pseudotsuga menziesii*. Other trees species such as *Pinus ponderosa* and/or *Populus tremuloides* may be present.....
..... *Pseudotsuga menziesii* **Forest Alliance******
- 33b. Conifer forests and woodlands that are Not dominated or codominated by *Pseudotsuga menziesii*.....
..... **Unidentified Forest Alliance**

Foothills Conifer Forests and Woodlands

- 34a. Foothill or prairie-breaks conifer woodlands dominated by *Pinus flexilis* and/or *Juniperus scopulorum* or *Juniperus osteosperma* (*Pinus ponderosa* is typically absent or low cover). Common foothill woodland in Wyoming, extending into north into Montana (*Juniperus* spp. may be absent especially in northern stands)
..... **Rocky Mountain Foothill Limber Pine-Juniper Woodland**
- 34b. Foothill conifer woodlands often dominated or codominated by *Pinus flexilis* and/or *Juniperus* spp. with *Pinus ponderosa* codominant (>5% cover) to dominant. Found in Map Zone 21 or possibly the eastern edge of Map Zone 19. **Southern Rocky Mountain Ponderosa Pine Woodland**

SAVANNAS, SHRUB-STEPPE AND SHRUBLANDS

35a. Savannas with 10-25% cover of trees (generally >3 m tall with a single main stem) over lush perennial grassland (25% or more herbaceous cover).....	36
35b. Shrub-steppe, shrublands and dwarf-shrublands (trees with less than 10% cover).....	39
36a. Open-canopied "savannas" dominated by <i>Larix occidentalis</i> . Occurs in interior montane zone of the Pacific Northwest from East Cascades to northern Rocky Mountains (Map Zones 10 and 19). Stands may be codominated by <i>Abies grandis</i> , <i>Abies lasiocarpa</i> , <i>Picea engelmannii</i> , or <i>Tsuga</i> spp.	Northern Rocky Mountain Western Larch Savanna
36b. Savanna not dominated or codominated by <i>Larix occidentalis</i>	37
37a. Foothill savanna with open tree layer is dominated by <i>Juniperus osteosperma</i> and/or <i>J. scopulorum</i> (at higher elevations). It is widespread in the intermountain western US and occurs at lower elevations in the Middle Rocky Mountains and on the western slope of the Northern Rocky Mountains	Inter-Mountain Basins Juniper Savanna
37b. Stands are Not dominated by species of <i>Juniperus</i>	38
38a. Montane savanna with open tree layer typically dominated by <i>Pinus ponderosa</i> (primarily var. <i>ponderosa</i>), but may have <i>Pseudotsuga menziesii</i> present to codominant; lower tree line/ecotone between grassland or shrubland and more mesic coniferous forests.....	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna
38b. Open structure foothill woodland and savanna that is substrate limited. Substrate will not support enough biomass to enough to carry fire. Wooded steppes occur at the lower tree line/ecotone between grasslands or shrublands and forests and woodlands typically on exposed, warm, dry, rocky or sandy sites that are too droughty to support a closed tree canopy. Stands found in inland Pacific Northwest and extend east into the Northern and Middle Rocky Mountains. <i>Pinus ponderosa</i> (vars. <i>ponderosa</i> and <i>scopulorum</i>) and <i>Pseudotsuga menziesii</i> are the predominant conifers (not always together); <i>Pinus flexilis</i> may be present or common.	Northern Rocky Mountain Foothill Conifer Wooded Steppe
39a. Dwarf or low shrubland or dwarf shrub-steppe (<0.5 m tall).....	40
39b. Shrubland or shrub-steppe (>0.5 m tall).....	50

Dwarf Shrublands (<0.5 M) And Dwarf Steppe

40a. Alpine and subalpine dwarf-shrublands or herbaceous areas with some dwarf shrubs, at or above upper tree line	41
40b. Low shrublands or shrub-steppe occurring well below the alpine / upper subalpine altitudes	42
41a. Alpine and subalpine dwarf-shrublands may be dominated by <i>Cassiope mertensiana</i> , <i>Salix arctica</i> , <i>S. reticulata</i> , <i>S. vestita</i> , or <i>Phyllodoce empetriformis</i> . <i>Vaccinium</i> spp., <i>Ledum glandulosum</i> , <i>Phyllodoce glanduliflora</i> , and <i>Kalmia microphylla</i> may also be shrub associates.	Rocky Mountain Alpine Dwarf-Shrubland
41b. Alpine and subalpine herbaceous tundra with some dwarf shrubs such as <i>Dryas octopetala</i> , <i>D. integrifolia</i> or <i>Arctostaphylos uva-ursi</i> , but the area is dominated by herbaceous vegetation although it can occur as a mosaic with the above species. Dominant plants in this alpine turf include: <i>Artemisia arctica</i> , <i>Carex elynoides</i> , <i>C. siccata</i> , <i>C. scirpoidea</i> , <i>C. nardina</i> , <i>C. rupestris</i> , <i>Festuca brachyphylla</i> , <i>F. idahoensis</i> , <i>Geum rossii</i> , <i>Kobresia myosuroides</i> , <i>Phlox pulvinata</i> , and <i>Trifolium dasyphyllum</i>	Rocky Mountain Dry Tundra
42a. Open dwarf-shrub canopy dominated by <i>Artemisia rigida</i>	Columbia Plateau Scabland Shrubland
42b. Low shrubland dominated by other species	43
43a. Stands generally occur in the mountains above 2000 m (6560 ft) elevations. <i>Artemisia tridentata</i> ssp <i>vaseyana</i> is typically the dominant sagebrush although other species may be present.	44
43b. Stands occur in foothills and plains, generally below 2000 m (6560 ft) elevations and are NOT dominated or codominated by <i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	45

- 44a. Montane or subalpine (>2000 m elevation) low shrubland or shrub-steppe dominated or codominated by *Artemisia tridentata* ssp. *vaseyana*, *A. tridentata* ssp. *spiciformis*, non-riparian *A. cana* ssp. *viscidula* and/or *A. arbuscula* ssp. *arbuscula*. *Symphoricarpos* spp. may codominate some stands. These are mixed-montane shrublands, with many shrubs commonly present in varying abundance. **Inter-Mountain Basins Montane Sagebrush Steppe**
- 44b. *Artemisia tridentata* ssp. *vaseyana* typically dominates shrub layer with 10% or more absolute cover and with typically less than 20% total perennial herbaceous cover. *Artemisia tridentata* ssp. *vaseyana* **Shrubland Alliance**
- 45a. Low shrublands dominated by *Artemisia arbuscula*, *A. nova*, *A. tridentata* ssp. *wyomingensis*, or *Purshia tridentata*, singly or mixed **46**
- 45b. Low shrublands dominated by other shrub species **48**
- 46a. Stands widespread in the Columbia Plateau and may occur along the western edges of Map Zone 21 and southern portions of Map Zones 10 and 19. Stands are dominated by *Artemisia arbuscula*, *Artemisia nova* alone or together and often with some *Purshia tridentata* (less than 5% relative cover). *Artemisia arbuscula* ssp. *longiloba* may be present as well. Stands typically occur on mountain ridges and flanks and broad terraces, ranging from 1000 to 3000 m in elevation **Columbia Plateau Low Sagebrush Steppe**
- 46b. Stands widespread in the Great Basin and may extend into the southern and eastern portions of Map Zone 21)..... **47**
- 47a. Stands in the Great Basin, on dry flats and plains, alluvial fans, rolling hills, rocky hill slopes, saddles and ridges at elevations between 1000 and 2600 m. Shrublands are dominated by *Artemisia nova* (mid and low elevations), *Artemisia arbuscula* (higher elevation) and may be codominated by *Artemisia tridentata* ssp. *wyomingensis* or *Chrysothamnus viscidiflorus*..... **Great Basin Xeric Mixed Sagebrush Shrubland**
- 47a. Low shrubland or shrub-steppe dominated or codominated by *Artemisia tripartita* ssp. *rupicola*. *Artemisia nova* may be codominant. Common in dry habitats throughout the basins of central and southern Wyoming and may extend into southeastern portions of Map Zone 21. Typically occurs on windswept ridges and south and west aspect slopes above 2135 m..... **Wyoming Basins Low Sagebrush Shrubland**
- 48a. Low shrubland or shrub-steppe dominated or codominated by *Chrysothamnus viscidiflorus*, *Ericameria greenei*, *Ericameria nauseosa*, *Ericameria parryi*, *Ephedra* spp., *Gutierrezia sarothrae* and/or *Krascheninnikovia lanata*. This broadly defined, widespread type occurs throughout the intermountain western U.S. typically at lower elevations on alluvial fans and flats with moderate to deep soils. This semi-arid shrub-steppe is typically dominated by graminoids (>25% cover) with an open shrub layer **Inter-Mountain Basins Semi-Desert Shrub-Steppe**
- 48b. Low shrubland or shrub-steppe dominated or codominated by species of *Atriplex*..... **49**
- 49a. Low shrubland or shrub-steppe dominated or codominated by *Atriplex confertifolia* or other *Atriplex* spp. Stands usually have an open shrub layer and are typical of saline basins, alluvial slopes and plains. Stands may be composed of one or more *Atriplex* species such as *A. confertifolia*, *A. canescens*, or *A. gardneri*. *Artemisia tridentata* may be present in some stands **Inter-Mountain Basins Mixed Salt Desert Scrub**
- 49b. Other dwarf-shrub taxa dominate the shrub layer **Undescribed or otherwise not included in this Key**

Shrublands And Shrub-Steppe (>0.5 M Tall)

- 50a. Shrublands or shrub-steppe dominated by taller (generally >0.5 m in height) *Artemisia* species **51**
- 50b. Shrublands or shrub-steppe dominated by species other than *Artemisia* species (which may be present but not the dominant shrub)..... **54**

Sagebrush Shrublands and Steppe

- 51a. Montane or subalpine (>2000 m elevation) shrubland or shrub-steppe dominated or codominated by *Artemisia tridentata* ssp. *vaseyana*, *A. tridentata* ssp. *spiciformis*, non-riparian *A. cana* ssp. *viscidula* and/or

<i>A. arbuscula</i> ssp. <i>arbuscula</i> . <i>Symphoricarpos</i> spp. may codominate some stands. These are mixed-montane shrublands, with many shrubs commonly present in varying abundance.	
	Inter-Mountain Basins Montane Sagebrush Steppe (52)
51b. Stands occur in foothills and plains, generally below 2000 m elevation and are NOT dominated or codominated by <i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	53
52a. <i>Artemisia tridentata</i> ssp. <i>vaseyana</i> typically dominates shrub layer with 10% or more absolute cover and with typically less than 25% total perennial herbaceous cover (or 20% perennial graminoid cover).	
	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> Shrubland Alliance
52b. <i>Artemisia tridentata</i> ssp. <i>vaseyana</i> typically dominates shrub layer with 10-40% absolute cover and with typically more than 25% total perennial herbaceous cover (or 20% perennial graminoid cover).	
	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> Shrub Herbaceous Alliance****
53a. <i>Artemisia tridentata</i> ssp. <i>tridentata</i> and/or <i>A. tridentata</i> ssp. <i>wyomingensis</i> dominate relative cover of shrub layer with 10% or more absolute cover and with less than 25% total perennial herbaceous cover; typically in broad basins between mountain ranges, plains and foothills between 1500 and 2300 m elevation. Soils are typically deep, well-drained and non-saline	
	Inter-Mountain Basins Big Sagebrush Shrubland
53b. <i>Artemisia tridentata</i> ssp. <i>tridentata</i> , <i>A. tridentata</i> ssp. <i>xericensis</i> , <i>A. tridentata</i> ssp. <i>wyomingensis</i> , <i>A. tripartita</i> ssp. <i>tripartita</i> , and/or <i>Purshia tridentata</i> dominate open to moderately dense (10-40% cover) shrub layer and with at least 25% total perennial herbaceous cover. The natural fire regime of this ecological system likely maintains a patchy distribution of shrubs, so the general aspect of the vegetation is a grassland	
	Inter-Mountain Basins Big Sagebrush Steppe
54a. Steppe or grassland is dominated by perennial bunch grasses and forbs (>25% cover) sometimes with a sparse (<10% cover) shrub layer; <i>Chrysothamnus viscidiflorus</i> , <i>Ericameria nauseosa</i> , <i>Tetradymia</i> spp., or <i>Artemisia</i> spp. may be present in disturbed stands. Associated graminoids include <i>Achnatherum hymenoides</i> , <i>Achnatherum thurberianum</i> , <i>Elymus elymoides</i> , <i>E. lanceolatus</i> ssp. <i>lanceolatus</i> , <i>Hesperostipa comata</i> , <i>Festuca idahoensis</i> , <i>Koeleria macrantha</i> , <i>Poa secunda</i> , and <i>Pseudoroegneria spicata</i> . This widespread Columbia Plateau systems is restricted to western portions of Map Zone 21 and southern portions of Map Zones 10 and 19	
	Columbia Plateau Steppe and Grassland
54b. Shrubland or shrub-steppe Not as above; occurring elsewhere in Map Zones 10, 21 or in 19	55
<u>Subalpine to Foothills Shrublands</u>	
55a. Shrublands of subalpine to foothill elevations.	56
55b. Shrublands of lower elevation foothills and plains in semi-desert or saline environments	60
56a. Shrubland occurs on the lower portions and runout zones of avalanche tracks throughout the northern and middle Rocky Mountains. Slopes are generally steep, ranging from 15-60%. Sites are often mesic to wet because avalanche paths are often in stream gullies, and snow deposition can be heavy in the runout zones. Stands are composed of a moderately dense, diverse mix of dwarfed and snow-damaged conifers and small, deciduous trees/shrubs. Characteristic species include <i>Abies lasiocarpa</i> , <i>Acer glabrum</i> , <i>Alnus viridis</i> ssp. <i>sinuata</i> or <i>Alnus incana</i> , <i>Populus balsamifera</i> ssp. <i>trichocarpa</i> , <i>Populus tremuloides</i> , or <i>Cornus sericea</i> . Other common woody plants include <i>Paxistima myrsinites</i> , <i>Sorbus scopulina</i> , and <i>Sorbus sitchensis</i> . The ground cover is moderately dense to dense with mesic forbs.	
	Northern Rocky Mountain Avalanche Chute Shrubland
56b. Shrublands Not as above	57
57a. Shrubland occurs within the zone of continuous forest in the upper montane and lower subalpine zones. Stands are dominated by <i>Menziesia ferruginea</i> , <i>Rhamnus alnifolia</i> , <i>Ribes lacustre</i> , <i>Rubus parviflorus</i> , <i>Alnus viridis</i> , <i>Rhododendron albiflorum</i> , <i>Sorbus scopulina</i> , <i>Sorbus sitchensis</i> , <i>Vaccinium myrtillus</i> , <i>V. scoparium</i> , and <i>V. membranaceum</i> occurring alone or in any combination. Other shrubs can include <i>Shepherdia canadensis</i> and <i>Ceanothus velutinus</i> , but these also commonly occur in Northern Rocky Mountain Lower Montane-Foothill Mesic Deciduous Shrubland.....	
	Northern Rocky Mountain Subalpine Deciduous Shrubland
57b. Shrublands of lower montane and foothill zones	58

- 58a. Shrublands dominated by *Cercocarpus ledifolius*. *Artemisia tridentata* ssp. *vaseyana*, *Purshia tridentata*, with species of *Arctostaphylos*, *Ribes*, or *Symphoricarpos* are often present.....
 **Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland**
- 58b. Shrubland Not dominated by *Cercocarpus ledifolius* **59**
- 59a. Shrub layer is dominated or codominated by *Amelanchier utahensis*, *Cercocarpus montanus*, *Purshia tridentata*, *Rhus trilobata*, *Ribes cereum*, *Symphoricarpos oreophilus*, *S. rotundifolia*, and/or *Yucca glauca*. *Artemisia tridentata* may be present, but not codominant. May occur in southern portions of Map Zone 21.
 **Rocky Mountain Lower Montane-Foothill Shrubland**
- 59b. Shrublands of lower montane and foothill elevations dominated by *Physocarpus malvaceus*, *Spiraea douglasii*, *Amelanchier alnifolia*, *Prunus emarginata*, *P. virginiana*, *Holodiscus discolor*; in more mesic areas, *Symphoricarpos albus*, *Menziesia ferruginea*, *Crataegus douglasii*, or *Rosa* spp. can be predominant; typically occurring around the fringes of the Columbia Basin and in northern Rockies
 **Northern Rocky Mountain Lower Montane Mesic Deciduous Shrubland**

Lowland or Desert Shrublands or Steppe

- 60a. Shrubland or shrub-steppe dominated or codominated by *Atriplex* spp. Stands usually open shrub layer, typical of saline basins, alluvial slopes and plains, and may be composed of one or more *Atriplex* species such as *Atriplex canescens*, *A. confertifolia*, or *A. gardneri*. *Artemisia tridentata* or *Sarcobatus vermiculatus* may be present in some stands. Herbaceous vegetation cover is often relatively low and may include *Distichlis spicata*, *Sporobolus airoides*, or other alkali/saline tolerant grasses. Stands are typically found in basins, but may extend into plains, piedmont and foothills, depending on soils conditions
 **Inter-Mountain Basins Mixed Salt Desert Scrub**
- 60b. Shrub-steppe or shrubland dominated or codominated *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*, *Ericameria parryi*, *Gutierrezia sarothrae*, *Krascheninnikovia lanata* and/or other shrubs and dwarf-shrubs. This shrub-steppe is typically dominated by perennial graminoids (>20% cover) with an open shrub layer, but includes denser shrublands with low grass cover and is often associated with disturbance. This broadly defined type is widespread throughout much of the intermountain western U.S. and typically occurs at lower elevations on alluvial fans and flats with moderate to deep soils.
 **Inter-Mountain Basins Semi-Desert Shrub-Steppe**

**KEY B (Middle and Northern Rocky Mountain): Herbaceous Ecological Systems
and Mappable Alliances
(Perennial graminoids dominant >20% cover with low woody cover <10%)**

1a. Land cover is restricted to drainages, semi-riparian flats, springs or seeps.....2
 1b. Land cover is upland vegetation.....6
 2a. Middle and lower elevation herbaceous wetlands (lower montane to valley floor).....3
 2b. High elevation herbaceous wetlands (subalpine-montane)4

Wetland Herbaceous

3b. Site is small patch, depressional boreal wetland found across Canada and extend south into the Pacific Maritime and Northern Rocky Mountains (Map Zones 10 & 19). These peatlands are typically formed as lake-filled basins or depressions. Soils are saturated throughout the growing season from groundwater upwelling. The vegetation is dominated by low ericaceous shrubs (including *Kalmia polifolia*, *Ledum groenlandicum*, *Betula nana* (= *Betula glandulosa*), *Myrica gale*, *Empetrum nigrum*, and *Chamaedaphne calyculata*), and with patches of graminoids and bryophyte lawns. *Sphagnum* species, including *Sphagnum magellanicum*, *Sphagnum fuscum*, and *Sphagnum cuspidatum* may be characteristic. Conifer trees sometimes codominate, especially late in succession. **Boreal Depressional Bog*****
 3b. Site is small patch, herbaceous wetland or emergent marsh dominated by common emergent and floating vegetation that includes species of *Scirpus* and/or *Schoenoplectus*, *Typha*, *Juncus*, *Potamogeton*, *Polygonum*, *Nuphar*, and *Phalaris* **North American Arid West Emergent Marsh*****
 4a. Wooded vernal pools from the northernmost portions of the Northern Rocky Mountains (Map Zones 10 & 19). Sites are small shallow circumneutral freshwater wetlands of glacial origin usually fill with water over the fall, winter and early spring, but then partially or totally dry up as the growing season progresses. They are known primarily from the Swan Valley in western Montana. These sites are usually shallow and less than two meters in depth. The pool substrate is a poorly drained often clayey layer with shallow organic sediments. They are surrounded and shaded by a variety of tree species; *Abies grandis*, *Abies lasiocarpa*, *Larix occidentalis*, *Picea engelmannii*, *Pinus contorta*, *Pseudotsuga menziesii* and the broadleaf trees *Populus trichocarpa* (black cottonwood) and to a lesser extent, *Populus tremuloides* (quaking aspen) and *Betula papyrifera* (paper birch). Common shrubs include; *Alnus incana*, *Cornus sericea*, *Rhamnus alnifolia* and *Salix* spp. Inflated sedge (*Carex vesicaria*) and reed canarygrass (*Phalaris arundinacea*) are common herbaceous plant associates
 **Northern Rocky Mountain Wooded Vernal Pool*****
 4b. Not as above.....5
 5a. Subalpine wetlands defined by groundwater inflows, mineral-rich alkaline soil and water chemistry, and peat accumulation of at least 40 cm..... **Rocky Mountain Subalpine - Montane Fen*****
 5b. Montane to alpine to wet meadows without a 40 cm deep organic layer.....
**Rocky Mountain Alpine - Montane Wet Meadow*****

Upland Herbaceous

6a. Herbaceous cover dominated by annual graminoids or annual and biennial forbs7
 6b. Herbaceous cover dominated by perennial species8
 7a. Herbaceous cover dominated by annual species of brome grass (typically *Bromus tectorum*, but including *B. japonicus* and *B. hordeaceus*).....
 **Invasive Annual Grassland**
 7b. Herbaceous cover dominated by introduced annual and biennial forbs (including *Ceratocephala testiculata*, *Halogeton glomeratus*, *Bassia scoparia*, *Lepidium perfoliatum*, *Salsola kali*, etc.).....

.....	Invasive Annual and Biennial Forbland	
8a. Herbaceous cover dominated by introduced perennial grasses and forbs (including <i>Agropyron cristatum</i> , <i>Alopecurus geniculatus</i> , <i>Agrostis stolonifera</i> , <i>Bromus inermis</i> , <i>Centaurea</i> sp., <i>Cirsium arvense</i> , <i>Euphorbia esula</i> , <i>Lepidium latifolium</i> , <i>Melilotus</i> spp., <i>Thinopyrum intermedium</i> , <i>Poa pratensis</i> , <i>Phleum pratense</i> , and other introduced forage species	Invasive Perennial Grassland and Forbland	9
8b. Herbaceous cover dominated by native species		9
9a Alpine herbaceous vegetation		10
9b Subalpine, montane, foothill and basin vegetation.....		11
10a. Alpine herbaceous vegetation dominated or codominated by graminoids with low cover of rock. Found between 3200 and 4500 m in elevation on gentle to moderate slopes, flat ridges, valleys, and basins. Dominant species include <i>Artemisia arctica</i> , <i>Carex</i> spp., <i>Deschampsia caespitosa</i> , <i>Festuca brachyphylla</i> , <i>F. idahoensis</i> , <i>Geum rossii</i> , <i>Kobresia myosuroides</i> , and <i>Trifolium dasyphyllum</i> . Cover of cushion plants is generally low	Rocky Mountain Dry Tundra	
10b. Alpine land cover has significant amounts (10-50% cover) of vascular herbaceous vegetation (typically dominated by cushion plants) and exposed gravels and rock outcrop (50-90% cover). Sites typically occur on upper slopes and ridges and are windswept by prevailing winds so that snow does not remain long.	Rocky Mountain Alpine Fell-Field	
11a. Subalpine and montane vegetation.....		12
11b. Lower montane, foothill, mesa and lower elevation grasslands found in basins and plains		14
12a. Subalpine herbaceous vegetation that is typically dominated or codominated by perennial forbs. Important taxa include forbs such as <i>Erigeron</i> spp., Asteraceae spp., <i>Mertensia</i> spp., <i>Penstemon</i> spp., <i>Campanula</i> spp., <i>Lupinus</i> spp., <i>Solidago</i> spp., <i>Ligusticum</i> spp., <i>Thalictrum occidentale</i> , <i>Valeriana sitchensis</i> , <i>Rudbeckia occidentalis</i> , <i>Balsamorhiza sagittata</i> , <i>Wyethia</i> spp., and grasses <i>Deschampsia caespitosa</i> , <i>Koeleria macrantha</i> , perennial <i>Bromus</i> spp., and species of <i>Carex</i> . Mesic shrubs <i>Dasiphora fruticosa ssp. floribunda</i> and <i>Symphoricarpos</i> spp. are occasionally present.	Rocky Mountain Subalpine Mesic Meadow	13
12a. Subalpine to montane herbaceous vegetation that is dominated or codominated by perennial graminoids.....		13
13a. Subalpine dry grasslands occur as small meadows to large open parks surrounded by conifer trees, but lack tree cover within them. Dominant species include <i>Leymus innovatus</i> , <i>Koeleria macrantha</i> , <i>Festuca campestris</i> , <i>F. idahoensis</i> , <i>F. viridula</i> , <i>Achnatherum occidentale</i> , <i>A. richardsonii</i> , <i>Bromus inermis ssp. pumpellianus</i> , <i>Elymus trachycaulus</i> , <i>Phleum alpinum</i> , <i>Trisetum spicatum</i> , and a variety of Carices, such as <i>Carex hoodii</i> , <i>C. obtusata</i> , and <i>C. scirpoidea</i> . Important forbs include <i>Lupinus argenteus var. laxiflorus</i> , <i>Potentilla diversifolia</i> , <i>Potentilla flabellifolia</i> , <i>Fragaria virginiana</i> , <i>Chamerion angustifolium</i> and other herbaceous species characteristic of the subalpine zone.....	Northern Rocky Mountain Subalpine - Upper Montane Grassland	
13b. Grasslands found at elevations from 300 to 1650 m, ranging from small meadows to large open parks surrounded by conifers in the lower montane, to extensive foothill and valley grasslands below the lower tree line. <i>Pseudoroegneria spicata</i> , <i>Festuca campestris</i> , <i>F. idahoensis</i> , or <i>Hesperostipa comata</i> commonly dominate sites on all aspects of level to moderate slopes and on certain steep slopes with a variety of other grasses, such as <i>Achnatherum hymenoides</i> , <i>A. occidentale</i> , <i>A. richardsonii</i> , <i>Hesperostipa curtiseta</i> , <i>Koeleria macrantha</i> , <i>Leymus cinereus</i> , <i>Elymus trachycaulus</i> , <i>Bromus inermis ssp. pumpellianus</i> (= <i>Bromus pumpellianus</i>), <i>Pascopyrum smithii</i> , and other graminoids such as <i>Carex filifolia</i> and <i>Danthonia intermedia</i>	Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland	
14a. Foothill grasslands, surrounded by forests		15
14b. Valley floor grasslands, surrounded by vegetation lower than lower tree line.....		16

- 15a. Foothill herbaceous vegetation found on steep open slopes, from 90 to 1525 m elevation in the canyons and valleys of the Columbia Basin, particularly along the Snake River canyon, the lower foothill slopes of the Blue Mountains, and along the main stem of the Columbia River. Settings are primarily long, steep slopes of 100 m to well over 400 m, and slope failure is a common process. Vegetation is dominated by patchy graminoid cover, cacti, and some forbs. *Pseudoroegneria spicata*, *Festuca idahoensis*, and *Opuntia polyacantha* are common species. Deciduous shrubs *Symphoricarpos* spp., *Physocarpus malvaceus*, *Holodiscus discolor*, and *Ribes* spp. are infrequent native species that may increase with fire exclusion.
 **Columbia Basin Foothill and Canyon Dry Grassland**
- 15b. Grassland dominated by perennial bunch grasses and forbs (>25% cover) sometimes with a sparse (<10% cover) shrub layer; *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*, *Tetradymia* spp., or *Artemisia* spp. may be present in disturbed stands. Associated graminoids include *Achnatherum hymenoides*, *A. thurberianum*, *Elymus elymoides*, *E. lanceolatus ssp. lanceolatus*, *Hesperostipa comata*, *Festuca idahoensis*, *Koeleria macrantha*, *Poa secunda*, and *Pseudoroegneria spicata*. Restricted to western portions of Map Zone 21 and southern portions of Map Zone 10 **Columbia Plateau Steppe and Grassland**
- 16a. This once-extensive grassland system occurs in eastern Washington and Oregon, and west-central Idaho, though in very small patches there. Characteristic species are *Pseudoroegneria spicata* and *Festuca idahoensis* with *Hesperostipa comata*, *Achnatherum scribneri*, *Leymus condensatus*, *Leymus cinereus*, *Koeleria macrantha*, *Pascopyrum smithii*, or *Poa secunda*. Remnant grasslands are now typically associated with steep and rocky sites or small and isolated sites within an agricultural landscape. Stands are restricted to western portions of Map Zone 10. **Columbia Basin Palouse Prairie**
- 16b. Widespread grassland on dry plains and mesas of this intermountain western US. Stands occur at approximately 1450 to 2320 m (4750-7610 feet) elevation and are dominated by *Achnatherum hymenoides*, *Aristida* spp., *Bouteloua gracilis*, *Hesperostipa comata*, *Muhlenbergia* spp., or *Pleuraphis jamesii*. Stands may include scattered shrubs and dwarf-shrubs of species of *Artemisia*, *Atriplex*, *Coleogyne*, *Ephedra*, *Gutierrezia*, or *Krascheninnikovia lanata*. **Inter-Mountain Basins Semi-Desert Grassland**