

Field Key to Ecological Systems and Target Alliances of the Great Basin, United States

**NatureServe
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Contacts:

Pat Comer, Chief Terrestrial Ecologist, 303-541-0352, pat_comer@natureserve.org

Keith Schulz, Regional Vegetation Ecologist, 303.541.0356, keith_schulz@natureserve.org

Marion Reid, Senior Regional Ecologist, 303.541.0342, marion_reid@natureserve.org

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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: 12 and 17 (the Great Basin). 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 Great Basin (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.

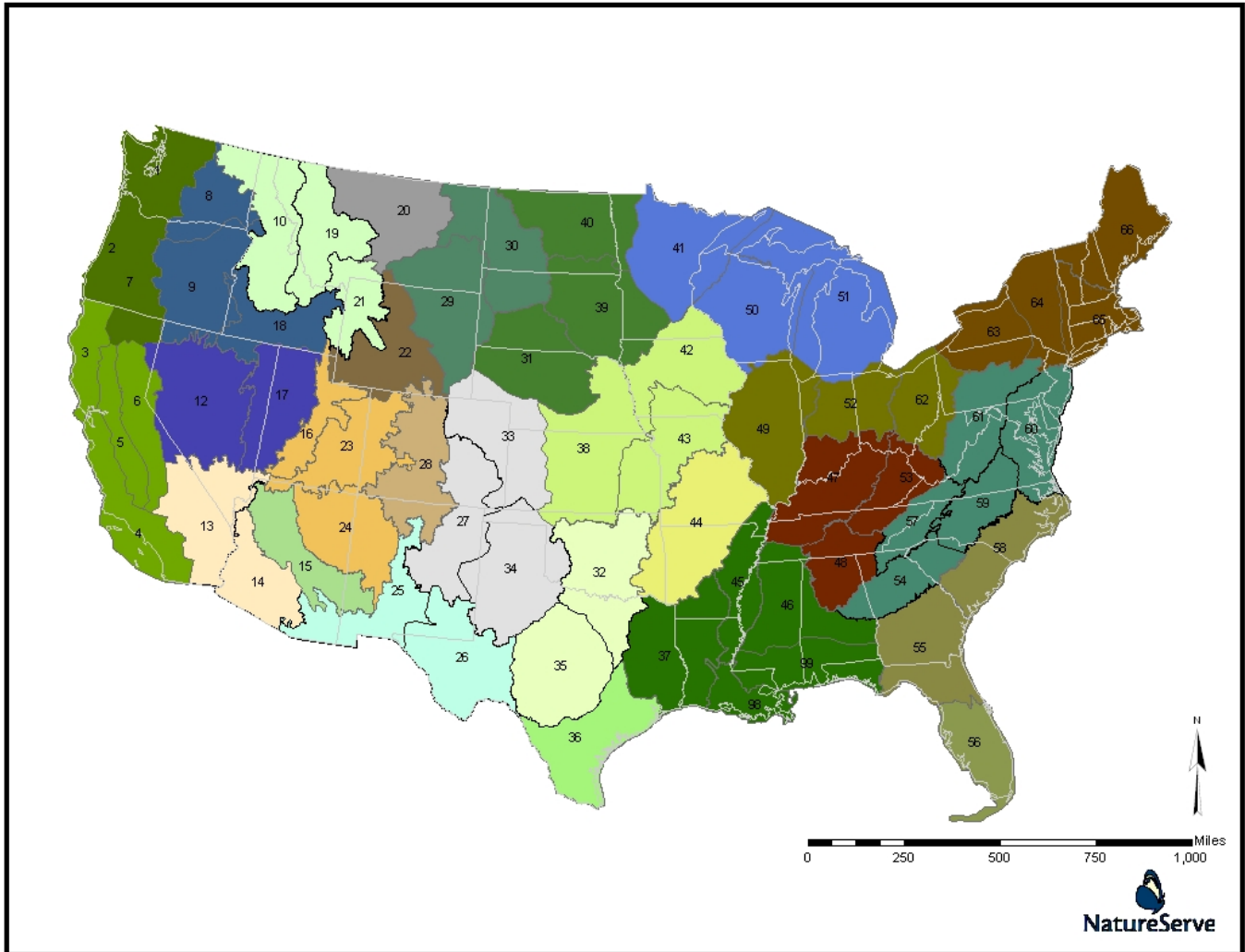


Figure 1. LANDFIRE map zone clusters with keys to ecological systems and selected alliances.

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 - Treed	Land cover is significantly altered/disturbed by introduced tree species.
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>Centaurea repens</i> , <i>Chrysanthemum leucanthemum</i> , <i>Cirsium arvense</i> , <i>C. vulgare</i> , <i>Euphorbia esula</i> , <i>Lepidium latifolia</i> , <i>Cardus nutans</i> , <i>Centaurea spp (difusa, solstitialis)</i> , <i>Salsola kali</i> , <i>Kochia scoparia</i> , <i>Halogeton glomeratus</i> , <i>Melilotus officinalis</i> , <i>M. albus</i> , and <i>Cardaria officinalis</i> .
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 spp.</i> (e.g., <i>madridentis</i> , <i>diandris</i> , <i>hordeaceus</i>), <i>Eschschlozia californica</i> , <i>Aira caryophyllea</i> , <i>Lasthenia spp.</i> , <i>Castilleja spp.</i> , <i>Avena spp</i> , <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>Centarea spp.</i> , <i>Cirsium arvense</i> , <i>Euphorbia esula</i> , <i>Lepidium spp.</i> , <i>Melilotus spp.</i>
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 spp.</i> , <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 arundancea</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.

Great Basin Ecological Systems and Target Alliances

This key is intended to identify Ecological Systems of the Great Basin (Mapping Zones #12 and #17). Additional alliance couplets are to proposed mappable or target alliances.

Please note the following conventions used to designate the systems and alliances:

- * indicates NS ecological system that has been grouped into a broader LANDFIRE Map Unit (wetland, riparian, and sparsely vegetated circumstances). Included to help clarify key, but crews need to record broader LANDFIRE Map Unit (**)
- ** indicates broader LANDFIRE Map Unit.
- *** typically a small patch ecological system type not being mapped by LANDFIRE.
- **** the alliance is not considered to be mappable for LANDFIRE purposes.

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 alpine; subalpine or below .....	.....5
4a. Land cover is mostly exposed rock (usually > 90% cover of either bedrock, boulders or scree). Non-vascular cover (lichens) may be significant.....	.....
(Rocky Mountain Alpine Bedrock and Scree*)	
Rocky Mountain Alpine/Montane Sparsely Vegetated Systems**	
4b. Land cover has significant amounts (10-50% cover) of vascular herbaceous vegetation (typically dominated by cushion plants) and exposed rock (50-90% % cover). Sites are windswept by prevailing winds and snow does not remain long.....	.....
Rocky Mountain Alpine Fell field	
5a. Land cover is bottomland or drainages .....	.....6
5b. Land cover is upland dune, mudstone or shale badlands, volcanic rock outcrop or cinder sites.....	.....9
6a. Land cover is a barren to sparsely vegetated playa .....	.....
(Inter-Mountain Basins Playa*)	
Inter-Mountain Basins Sparsely Vegetated Systems ** (7)	
6b. Land cover is a restricted to drainages with a variety of sparse or patchy vegetation including <i>Sarcobatus vermiculatus</i> , <i>Ericameria nauseosa</i> , <i>Fallugia paradoxa</i> , <i>Artemisia cana ssp. cana</i> or <i>Grayia spinosa</i> . Herbaceous vegetation such as perennial grasses, <i>Distichlis spicata</i> or <i>Sporobolus airoides</i> , may also dominate wash.....	.....
(Inter-Mountain Basins Wash***)	
Inter-Mountain Basins Sparsely Vegetated Systems** (8)	
7a. Land cover is volcanic in origin (includes lava, cinder, ash deposits) .....	.....
(Inter-Mountain Basins Volcanic Rock and Cinder Land*)	
Inter-Mountain Basins Sparsely Vegetated Systems**	
7b. Land cover is not sparsely vegetated volcanic substrate. ....	.....8
8a. Land cover is non-volcanic, consolidated rock (cliffs, outcrops).....	.....9
8b. Land cover is unconsolidated material.....	.....11

- 9a. Land cover is largely of exposed bedrock (usually sedimentary) and scree found within the Colorado Plateau Region (extreme eastern Great Basin). Typically occurs below montane elevation zone (<2000 m).
 **(Colorado Plateau Mixed Bedrock Canyon and Tableland*)**
 **Inter-Mountain Basins Sparsely Vegetated Systems****
- 9b. Not as above.....**10**
- 10a. Land cover is largely of exposed bedrock and restricted to montane-subalpine zone in Wasatch Mountains (extreme eastern Great Basin), Colorado Plateau and Rocky Mountains.....
 **(Rocky Mountain Cliff, Canyon and Massive Bedrock*)**
 **Rocky Mountain Alpine/Montane Sparsely Vegetated Systems****
- 10b. 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*)
 **(Inter-Mountain Basins Cliff and Canyon*)**
 **Inter-Mountain Basins Sparsely Vegetated Systems****
- 11a. Land cover is active or partially vegetated dunes or sand sheets
 **(Inter-Mountain Basins Active and Stabilized Dune*)**
 **Inter-Mountain Basins Sparsely Vegetated Systems****
- 11b. Land cover is NOT dunes or sand sheets**12**
- 12a. Land cover is eroded shale or clay hills
 **(Inter-Mountain Basins Shale Badland*)**
 **Inter-Mountain Basins Sparsely Vegetated Systems ****
- 12b. Land cover is barren, but not as above (review land use and disturbed classes).....
 **(Undifferentiated Barren*)**
 **Inter-Mountain Basins Sparsely Vegetated Systems****

**KEY A (Great Basin): Woodland, Savanna, Shrub Steppe or Shrubland
Ecological Systems and Mappable Alliances
(Woody cover > 10% cover present)**

- 1a. Land cover is restricted to drainages, semi-riparian flats, springs or seeps.....2
 1b. Land cover is upland vegetation.....9
- 2a. Higher elevation riparian woodlands and shrublands (subalpine-montane).....3
 2b. Middle and lower elevation woodlands, shrublands and steppe (lower montane to valley floor).....4
- 3a. Woodlands restricted to drainages and steam terraces
 (**Rocky Mountain Subalpine - Montane Riparian Woodland***)
 **Rocky Mountain Subalpine/Upper Montane Riparian Systems****
- 3b. Shrublands restricted to drainages and stream terraces
 (**Rocky Mountain Subalpine - Montane Riparian Shrubland***)
 **Rocky Mountain Subalpine/Upper Montane Riparian Systems****
- 4a. *Artemisia cana* ssp. *bolanderi* or *A. cana*. ssp. *viscidula* dominated shrubland or steppe occurring along drainages in Great Basin mountain ranges to lowland depressional wetlands or non-alkaline playas in the northern Great Basin and Columbia Basin. *Artemisia tridentata* ssp. *tridentatata*, *A. tridentata* ssp. *wyomingensis* or *A. tridentata* ssp. *viscidula* are occasionally co-dominant. The herbaceous layer generally has 25% or more cover of perennials, typically graminoids with *Poa secunda* (= *P. nevadensis*), *P. cusickii*, *Mulhenbergia filiformis*, *M. richardsonis*, and *Leymus cinereus* dominant at the drier sites, *Eleocharis palustris*, *Deschampsia caespitosa* and *Carex* species at the wetter or higher elevation sites.
 **Columbia Plateau Silver Sagebrush Seasonally Flooded Shrub Steppe*****
- 4b. Woodlands, shrublands, or steppe NOT dominated by *Artemisia cana*.....5
- 5a. Lower montane and foothill woodlands and shrublands restricted to drainages and semi-riparian flats and basins.....6
 5b. Valley bottom shrublands restricted to temporarily flooded drainages and flats8
- 6a. Lower montane and foothill woodlands and shrublands of mountain ranges of the Great Basin and along the eastern slope of the Sierra Nevada within a broad elevation range from about 1220 m (4000 feet) to over 2135 m (7000 feet). (**Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland***)
 **Inter-Mountain Basins Montane Riparian Systems** (7)**
- 6b. Lower montane and foothill woodlands and shrublands along the Wasatch Plateau in the extreme eastern Great Basin.....(**Rocky Mountain Lower Montane Riparian Woodland and Shrubland***)
 **Rocky Mountain Montane Riparian Systems ** (7)**
- 7a. 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****
- 7b. Woodlands and shrublands restricted to drainages and semi-riparian flats that are dominated by *Tamarix* spp(**Tamarix spp. Semi-Natural Temporarily Flooded Shrubland Alliance***)
 **Invasive Riparian Woodland and Shrubland****
- 8a. Open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus* that are widespread in the Intermountain Basins region. *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**
- 8b. 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

codominate including <i>Artemisia tridentata ssp. wyomingensis</i> . Typical of saline basins, alluvial slopes and plains across the Intermountain western U.S and extends into the Great Plains	
.....	Inter-Mountain Basins Mixed Salt Desert Scrub
9a. Upland forests and woodlands (trees generally with >25% cover)	10
9b. 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).....	30
10a. Broadleaf forests and woodlands or mixed conifer-aspen forests and woodlands (deciduous trees make up 25-100% of the tree canopy).	11
10b. Conifer forests and woodlands (deciduous trees may make up less than 25% cover of the tree canopy).....	13
11a. Broadleaf forest or woodland dominated by <i>Acer grandidentatum</i> , often found in mesic ravines	
.....	Rocky Mountain Bigtooth Maple Ravine Woodland
11b. Not as above.....	12
12a. 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.....	
.....	Rocky Mountain Aspen Forest and Woodland
12b. Mixed conifer-broadleaf forests and woodlands co-dominated by <i>Populus tremuloides</i> and a conifer trees such as <i>Abies concolor</i> or <i>Pseudotsuga menziesii</i> (both broadleaf and conifer tree cover over 25% total tree canopy cover)	
.....	Inter-Mountain Basins Aspen - Mixed Conifer Forest and Woodland
13a. Subalpine conifer forests and woodlands (spruce-fir zone).....	14
13b. Montane and foothills conifer forests and woodlands (Douglas-fir – white fir zone).....	19
14a. Subalpine conifer forests and woodlands dominated or co-dominated by <i>Pinus albicaulis</i> , <i>Pinus aristata</i> or <i>P. longaeva</i> and/or <i>P. flexilis</i>	15
14b. Subalpine conifer forests and woodlands NOT dominated or co-dominated by <i>Pinus albicaulis</i> , <i>Pinus aristata</i> or <i>P. longaeva</i> and/or <i>P. flexilis</i>	18
15a. Conifer forests and woodlands dominated or co-dominated by <i>Pinus albicaulis</i> (restricted to mountains of western Nevada and California)	16
15b. Conifer forests and woodlands Not dominated or co-dominated dominated by <i>Pinus albicaulis</i>	17
16a. Conifer forests and woodlands dominated or co-dominated by <i>Pinus albicaulis</i> . Other trees in the canopy may include sierran species such as <i>Pinus contorta var. murrayana</i> , <i>Pinus balfouriana</i> , <i>Pinus flexilis</i> , <i>Pinus monticola</i> , <i>Juniperus occidentalis var. australis</i> on rocky slopes usually upper subalpine zone (restricted to mountains of California, western Nevada and western Oregon)	
.....	Mediterranean California Subalpine Woodland
16b. Conifer forests and woodlands dominated or co-dominated by <i>Pinus albicaulis</i> (restricted to mountains of northeastern Nevada and northern Rockies).....	Northern Rocky Mountain Subalpine Woodland and Parkland

17a. Conifer forests and woodlands dominated or co-dominated by <i>Pinus longaeva</i> and/or <i>P. flexilis</i> (restricted to mountains of western Utah, including the Uinta Mtns., Nevada and California)	
.....	Inter-Mountain Basins Subalpine Limber-Bristlecone Pine Woodland
17b. Conifer forests and woodlands dominated or co-dominated by <i>Pinus aristata</i> and/or <i>P. flexilis</i> (restricted to the Rocky Mountain cordillera and San Francisco Mountains near Flagstaff, AZ)	
.....	Rocky Mountain Subalpine Limber-Bristlecone Pine Woodland
18a. Conifer forests and woodlands strongly dominated by <i>Pinus contorta</i> var. <i>murrayana</i> , sometimes with <i>Populus tremuloides</i> or <i>Populus trichocarpa</i> codominating. Found in upper montane to subalpine elevations of the central and northern Sierra Nevada and Peninsular Ranges where cold-dry conditions exist (1800-2450 m [6000-8000 feet] in the north and 2450-3600 m [8000-12,000 feet] in the south) (restricted to mountains of California and western Nevada)	
.....	Sierra Nevada Subalpine Lodgepole Pine Forest and Woodland
18b. Conifer forests and woodlands typically dominated or co-dominated by <i>Abies lasiocarpa</i> and/or <i>Picea engelmannii</i> sometimes with <i>Pinus contorta</i> or <i>Populus tremuloides</i> codominating.....	19
19a. Matrix subalpine conifer forests and woodlands of dryer environments that are dominated or co-dominated by <i>Abies lasiocarpa</i> and/or <i>Picea engelmannii</i> (excludes stands growing on relatively mesic sites with mesic understory species).....	
.....	Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland
19b. Large patch subalpine conifer forests and woodlands of relative mesic environments (such as north aspect toeslopes) that are dominated or co-dominated by <i>Abies lasiocarpa</i> and/or <i>Picea engelmannii</i> with mesic understory species	
.....	Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland
20a. Montane conifer forests and woodlands	21
20b. Foothill conifer forests and woodlands (pinyon-juniper zone)	26
21a. Montane conifer forests and woodlands restricted in western Nevada with Sierran flora.....	22
21b. Wider ranging montane conifer forests and woodlands that occur within Great Basin, Columbia Basin or Colorado Plateau	23
22a. Conifer forests and woodlands strongly dominated by <i>Pinus contorta</i> var. <i>murrayana</i> , sometimes with <i>Populus tremuloides</i> or <i>Populus trichocarpa</i> codominating. Found in upper montane to subalpine elevations of the central and northern Sierra Nevada and Peninsular Ranges where cold-dry conditions exist (1800-2450 m [6000-8000 feet] in the north and 2450-3600 m [8000-12,000 feet] in the south). Restricted to mountains of California and western Nevada in Map Zone 12.	
.....	Sierra Nevada Subalpine Lodgepole Pine Forest and Woodland
22b. Conifer forests and woodlands dominated by <i>Pinus jeffreyi</i> and/or <i>Pinus ponderosa</i> , which tend to segregate by soil fertility and temperature regimes, but may co-occur in certain areas such as the Modoc Plateau. <i>Pinus jeffreyi</i> replaces <i>Pinus ponderosa</i> as dominant at higher elevations. Associated trees include <i>Abies concolor</i> , <i>Pinus contorta</i> , and <i>Pinus monophylla</i> . Found on warm, xeric sites in foothills and mountains from southern Oregon (600-1830 m [1800-5000 feet]) south into northern Baja California (1200-2740 m [4000-8300 feet]). Restricted to foothills and mountains of California and western Nevada in Map Zone 12	
.....	Mediterranean California Ponderosa-Jeffrey Pine Forest and Woodland
23a. Conifer forests and woodlands dominated or co-dominated by <i>Abies concolor</i> or <i>Pseudotsuga menziesii</i> . If present, <i>Pinus ponderosa</i> does not dominate (<50% total tree canopy).....	24
23b. Conifer woodlands dominated by <i>Pinus ponderosa</i> . <i>Pseudotsuga menziesii</i> , <i>Pinus edulis</i> and <i>Juniiperus</i> spp. trees may be present to codominant	Southern Rocky Mountain Ponderosa Pine Woodland
24a. Matrix montane conifer forests and woodlands of dryer environments that are dominated or co-dominated by <i>Abies concolor</i> , <i>Pseudotsuga menziesii</i> , or occasionally co-dominated by <i>Pinus ponderosa</i>	
.....	Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland (25)
24b. Large patch montane conifer forests and woodlands of relative mesic environments (cool ravines and on north-facing toeslopes) often with mesic understory species	
.....	Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland

- 25a. Conifer forests dominated or co-dominated by *Abies concolor*. Other trees species such as *Pseudotsuga menziesii*, *Pinus ponderosa* and/or *Populus tremuloides* may be present. Significant *Abies concolor* understory is present if mature *Abies concolor* are not codominant in tree canopy **Abies concolor Forest Alliance**
- 25b. Conifer forests dominated or co-dominated by *Pseudotsuga menziesii* with *Abies concolor* absent. Often includes mixed conifer forest and woodlands common at montane elevations. **Pseudotsuga menziesii Forest Alliance*****
- 26a. Foothill conifer woodlands co-dominated by *Pinus ponderosa* and *Pinus monophylla*, *Pinus edulis* and and/or *Juniperus* spp. **Southern Rocky Mountain Ponderosa Pine Woodland**
- 26b. Foothill conifer woodlands dominated or co-dominated by *Pinus monophylla*, *Pinus edulis* and/or *Juniperus* spp. *Pinus ponderosa* is absent or limited to a few scattered individuals (very low cover, <5%).27
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- 28b. Woodlands dominated by *Juniperus occidentalis* (>15% tree cover). Perennial graminoid cover is typically low. If perennial graminoid cover > 20% cover, then tree cover is over 25% cover. Stands are restricted to northwestern Nevada and northeastern California including the Modoc Plateau in map zone 12, but extend up into the Columbia Basin, and along Sierra Nevada and Cascade Mountains **Juniperus occidentalis Woodland Alliance**
- 29a. Foothill conifer woodlands on in the extreme eastern part of the Great Basin on the Wasatch or Colorado Plateau that are dominated or co-dominated by *Pinus edulis* and/or *Juniperus osteosperma* (generally restricted to higher elevations > 1750 m where sympatric with *Pinus monophylla* Woodlands) **(Colorado Plateau Pinyon-Juniper Woodland*)**
..... **Colorado Plateau Pinyon-Juniper Woodland and Shrubland****
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- 32b. Tree layer dominated by *Juniperus osteosperma*. Widespread savanna in Great Basin and Colorado Plateau **Inter-Mountain Basins Juniper Savanna**

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45b. Upland chaparral occurs in foothills, mountain slopes and canyons in dryer habitats below the encinal (evergreen oak) and Pinyon-Juniper woodlands (1000-2200 m elevation) in central and southern Arizona, southern and western New Mexico, southeast Nevada, and southwest Utah. Vegetation is composed of evergreen broadleaved shrubs with a moderate to dense shrub canopy; dominated by shrubs such as <i>Quercus turbinella</i> , <i>Arctostaphylos pungens</i> (and <i>Arctostaphylos pringlei</i> at higher elevations) <i>Cercocarpus montanus</i> , <i>Canotia holacantha</i> , <i>Ceanothus greggii</i> , <i>Forestiera pubescens</i> (= <i>Forestiera neomexicana</i>), <i>Garrya wrightii</i> , <i>Juniperus deppeana</i> , <i>Purshia stansburiana</i> , <i>Rhus ovata</i> , <i>Rhus trilobata</i> , or <i>Quercus toumeyi</i> ,	Mogollon Chaparral (46)
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48b. Upland chaparral vegetation dominated by the shrub <i>Cercocarpus montanus</i>	

.....**Cercocarpus montanus Shrubland Alliance**

49a. Upland shrublands occur on plains and foothills in the southern portion of the Great Basin in the broad transition zone from desert scrub in the Mojave Desert. Vegetation is variable, but in the transition zone shrublands are typically dominated by *Coleogyne ramosissima*, *Ephedra nevadensis*, *Grayia spinosa*, or *Menodora spinescens*. Perennial desert grasses are important in some stands.
.....**Mojave Mid-Elevation Mixed Desert Scrub (50)**

49b. Not as above.....**51**

50a. *Coleogyne ramosissima* dominates short shrub layer. Often occurs on sandy soils.....
.....**Coleogyne ramosissima Shrubland Alliance**

50b. *Grayia spinosa* dominates short shrub layer.**Grayia spinosa Shrubland Alliance**

51a. Open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus* that are widespread in the Intermountain Basins region. *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**

51b. Open to moderately dense shrublands Not dominated or codominated by *Sarcobatus vermiculatus***52**

52a. Upland desert scrub widespread in lower Colorado River Valley of the Sonoran Desert and the Mojave Desert. Stands are typically dominated by an open shrub canopy of *Larrea tridentata* and *Ambrosia dumosa* without a xeromorphic wooded layer. This system includes stands with as little as 2% woody cover and typically occurs below 750 m. elevation.
.....**Sonora-Mojave Creosotebush-White bursage Desert Scrub**

52b. Not as above.....**53**

53a. Upland 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, but upland shrub *Sarcobatus baileyii* may be present to dominant. Other shrubs present to codominant include *Artemisia tridentata ssp. wyomingensis* and *Picrothamnus desertorum*. Generally occurs on valley bottoms, flats and lower slopes.....**Inter-Mountain Basins Mixed Salt Desert Scrub**

53b. Not as above.....**54**

54a. *Ericameria nauseosa*, *Chrysothamnus viscidiflorus* and/or *Gutierrezia sarothrae* dominate an open shrub layer with or without grass understory. Occurs in a variety of habitats including foothills, terraces, gentle slopes, often on disturbed sites.**Inter-Mountain Basins Semi-Desert Shrub Steppe**

54b. Not as above.....**Undescribed Shrubland or SteppeSystem**

KEY B (Great Basin): Herbaceous Ecological Systems and Alliances
(Herbaceous layer 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.....4

2a. High elevation herbaceous wetlands (subalpine-montane)3
2b. Middle and lower elevation herbaceous wetlands (lower montane to valley floor).....
..... **North American Arid West Emergent Marsh*****

3a. Alpine to montane wet meadows without a 40 cm deep organic layer.
..... **Rocky Mountain Alpine - Montane Wet Meadow*****
3b. Subalpine to montane wetlands with a 40 cm deep organic layer. This wetland is typically groundwater fed.....
..... **Rocky Mountain Subalpine - Montane Fen*****

4a. Herbaceous cover dominated by annual graminoids or annual and biennial forbs5
4b. Herbaceous cover dominated by perennial species6

5a. Herbaceous cover dominated by annual species of brome grass (typically *Bromus tectorum*, but including
Bromus japonicus, *Bromus rubens*, *Bromus hordeaceus*, *Bromus rigidus*)
..... **Invasive Annual Grassland**

5b. 5a. Herbaceous cover dominated by introduced annual and biennial forbs (including *Ceratocephala*
testiculata, *Halogeton glomeratus*, *Kochia scoparium*, *Lepidium perfoliatum*, *Salsola kali*, etc.)
..... **Invasive Annual and Biennial Forbland**

6a. Herbaceous cover dominated by introduced perennial grasses and forbs (including *Agropyron cristatum*,
Alopecurus geniculatus, *Agrostis stolonifera*, *Bromus inermis*, *Cenntareau sp.*, *Cirsium arvense*, *Euphorbia*
esula, *Lepidium latifolium*, *Melilotus spp.*, *Thinopyrum intermedium*, *Poa pratensis*, *Phleum pratense*, and
other introduced forage species **Invasive Perennial Grassland and Forbland**
6b. Herbaceous cover dominated by native species7

7a. Alpine herbaceous vegetation.....8
7b. Subalpine, montane, foothill and basin vegetation.....9

8a. Gound cover dominated by short graminoids and forbs forming a turf **Rocky Mountain Dry Tundra**
8b. Ground cover has significant amounts (10-50%) of vascular herbaceous vegetation (typically dominated by
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not remain long..... **Rocky Mountain Alpine Fell field**

9a. Subalpine herbaceous vegetation that is typically dominated or codominated by perennial forbs.....
..... **Rocky Mountain Subalpine Mesic Meadow**
9. Montane, foothill and basin herbaceous vegetation10

10a. Montane – subalpine grasslands found between 2200-3000 m elevation on dry flat to rolling plains or
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spicata.
..... **Southern Rocky Mountain Montane - Subalpine Grassland**
10b. Foothill and basin vegetation11

- 11a. Extensive grasslands that are widespread in Columbia Basin and extend into the northern Great Basin. This grassland is dominated by perennial bunchgrasses 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*, *Elymus lanceolatus* var. *lanceolatus*, *Hesperostipa comata*, *Festuca idahoensis*, *F. campestris*, *Koeleria macrantha*, *Poa secunda* and *Pseudoroegneria spicata*. These grasslands are extensive and not grass-dominated patches within the sagebrush shrub steppe ecological system. These are relatively mesic grasslands when compared to Inter-Mountain Basins Semi-Desert Grassland.**Columbia Plateau Steppe and-Grassland**
- 11b. Not as above.....**10**
- 12a Widespread and diverse dry grasslands typically of foothills and basins within the intermountain Western US. Generally patchy and dryer than the Columbia Basin where they overlap. Common perennial grass species include *Achnatherum hymenoides*, *Bouteloua gracilis*, *Hesperostipa comata*, *Pleuraphis jamesii*, *Poa secunda* or *Sporobolus airoides*. If dominated by *Pseudoroegneria spicata* or *Festuca idahoensis*, then stand occurs outside the geographic or environmental range of the Columbia Plateau Steppe and Grassland.....**Inter-Mountain Basins Semi-Desert Grassland**
- 12 Not as above.....**Undescribed Grassland System**