

**Field Key to Ecological Systems and Target Alliances  
of Map Zone 20 in Central Montana, 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 zone 20 (central Montana). The systems and alliances included in these keys are intended to represent the legend that LANDFIRE will be striving to map for existing vegetation (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.

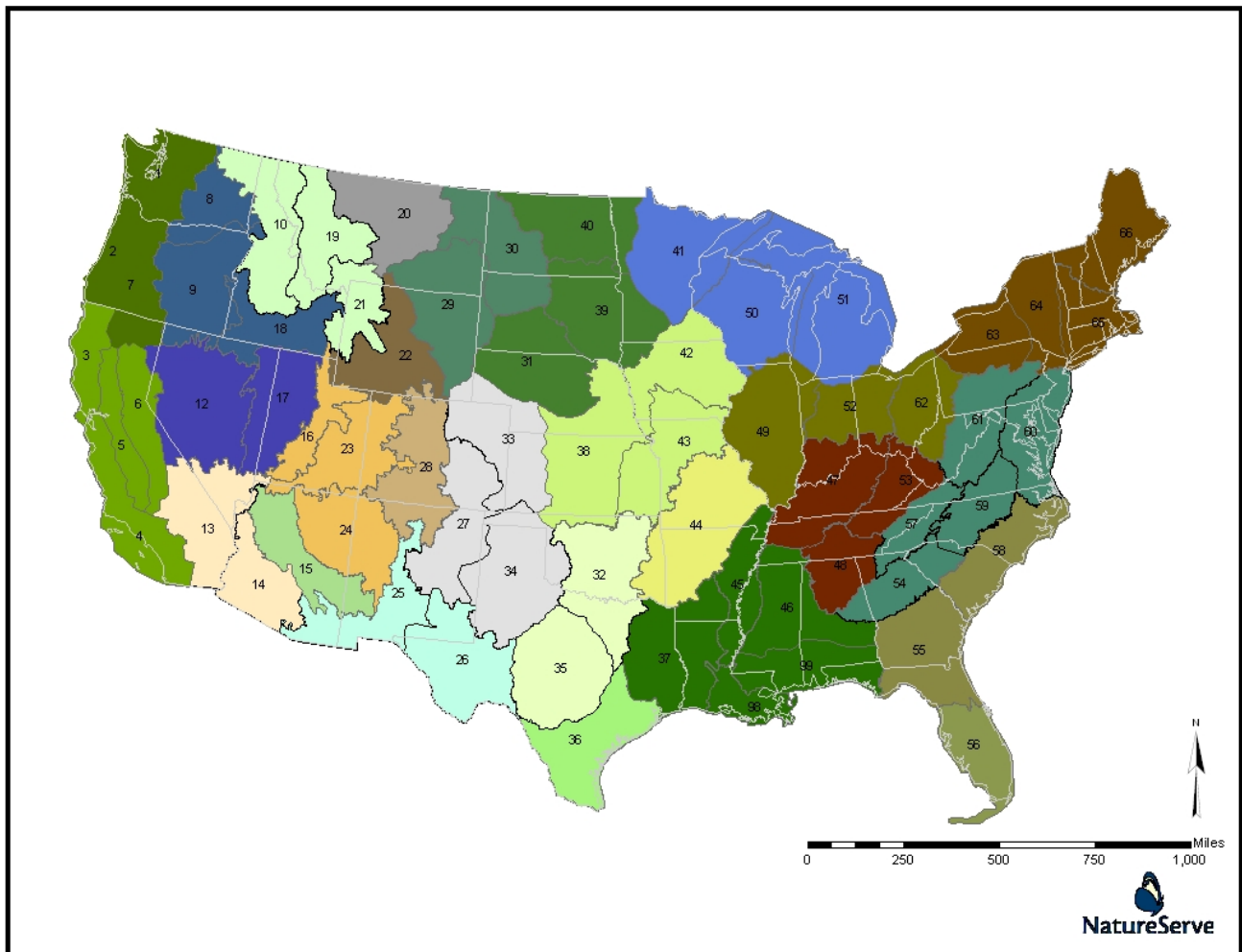
Plant names are almost always in Latin and follow the nomenclature of Kartesz (1999). In limited cases, we have included synonyms for some taxa.

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. *Abies concolor* Forest Alliance).

Systems do not include Latin species names in them, and always start with a Biogeographic region (e.g. Inter-Mountain Basins Big Sagebrush Steppe). 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.

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.



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

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.

<b>Perennial Ice/Snow</b>	
<b>SEMI-NATURAL / ALTERED VEGETATION</b>	
<b>Ruderal Vegetation</b>	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	
<b>Introduced Vegetation</b>	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>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 caryophylla</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.
<b>Modified/Managed Vegetation</b>	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.
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## Map Zone 20 Ecological Systems and Target Alliances

This key is intended for identifying Ecological Systems and selected alliances that are found in the central Montana east of the Rocky Mountain Front. 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 and included for completeness of the key.

\*\*\*\* 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 herbaceous 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. 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\*\***
- 3b. Barren and sparsely vegetated substrates NOT alpine. Land cover is upland dune, mudstone or shale  
 badlands, escarpments or canyons..... **4**
  
- 4a. Land cover is consolidated rock (cliffs, outcrops)..... **5**
- 4b. Land cover is unconsolidated material..... **6**
  
- 5a. Land cover is largely of exposed bedrock cliffs and outcrops common on escarpments in the plains.  
 Substrates range from consolidated sandstone and limestone to gravelly breaks. Vegetation is typically  
 restricted to shelves, cracks and crevices in the rock. Scattered *Pinus flexilis*, *P. ponderosa*, *Juniperus* spp.  
 trees or shrubs such as *Artemisia longifolia*, *Artemisia tridentata*, *Cercocarpus* spp. and *Rhus trilobata* are  
 often present. Some stands of Western Great Plains Badlands are similar, but they occur in much larger  
 patches and on more erodible soils than this small patch system ..... **(Western Great Plains Cliff and Outcrop\*)**  
 ..... **Western Great Plains Sparsely Vegetated Systems\*\***
- 5ba. Land cover is largely of exposed bedrock and restricted to foothill-subalpine zones in isolated mountains  
 in central Montana..... **(Rocky Mountain Cliff, Canyon and Massive Bedrock\*)**  
 ..... **Rocky Mountain Alpine/Montane Sparsely Vegetated Systems\*\***
  
- 6a. Blowouts included in vegetated sand deposits that occur in eastern Montana. Common herbaceous species  
 include *Achnatherum hymenoides*, *Hesperostipa comata*, *Lygodesmia juncea*, *Muhlenbergia arenicola*,  
*Muhlenbergia pungens*, *Psoralidium lanceolatum*, and *Sporobolus cryptandrus*. Shrub such as *Artemisia*  
*cana*, *A. tridentata*, *Ericameria nauseosa*, and *Purshia tridentata* may also be present.....  
 ..... **Western Great Plains Sand Prairie**

- 6b. Large patch ecological system is found within the Great Plains, This system is typified by extremely dry and easily eroded, consolidated clays soils with bands of sandstone or isolated consolidates and little to no cover of vegetation (usually less than 10%). Common species can include scattered individuals of *Grindelia squarrosa*, *Gutierrezia sarothrae*, or *Eriogonum* spp. Patches of *Artemisia* spp. can also occur. This system occurs where the land lies well above its local base level and is created by several factors including elevation, rainfall, carving action of streams..... (Western Great Plains Badlands\*)  
 ..... **Western Great Plains Sparsely Vegetated Systems\*\***

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

- 1a. Land cover is restricted to riparian or floodplain zones of drainages, semi-riparian flats, springs or seeps and areas with high water tables.....2  
 1b. Land cover is upland vegetation without seeps and areas with high water tables.....13

**RIPARIAN WOODLAND AND SHRUBLAND SYSTEMS**

- 2a. Higher elevation woodlands and shrublands generally >2600 m (8530 feet) (subalpine-montane).....3  
 2b. Middle and lower elevation (generally <2600 m) (8530 feet) woodlands and shrublands (lower montane to valley floor).....5
- 3a. 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. Soils are poorly drained, mucky areas, often forming 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**  
 3b. Well drained soils of drainages, steam 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 .....4
- 4a. Woodlands restricted to drainages, stream terraces, semi-riparian flats and spring or seep fed slopes. Common tree species vary across the latitudinal range, although it usually includes *Abies lasiocarpa* and/or *Picea engelmannii*; other important species include *Pseudotsuga menziesii*, *Picea pungens*, *Picea engelmannii* X *glauca*, *Populus tremuloides*, and *Juniperus scopulorum* .....**(Rocky Mountain Subalpine - Montane Riparian Woodland\*)**  
 ..... **Rocky Mountain Subalpine/Upper Montane Riparian Systems\*\***
- 4b. Shrublands restricted to drainages, stream terraces, semi-riparian flats and spring or seep fed slopes. Dominant shrubs reflect the large elevational gradient and include *Alnus incana*, *Betula nana*, *Betula occidentalis*, *Cornus sericea*, *Salix bebbiana*, *Salix boothii*, *Salix brachycarpa*, *Salix drummondiana*, *Salix eriocephala*, *Salix geyeriana*, *Salix monticola*, *Salix planifolia*, and *Salix wolfii*. Generally the upland vegetation surrounding these riparian systems are of either conifer or aspen forests.....**(Rocky Mountain Subalpine - Montane Riparian Shrubland\*)**  
 ..... **Rocky Mountain Subalpine/Upper Montane Riparian Systems\*\***
- 5a. Lower montane, foothill and plains woodlands and shrublands restricted to drainages, floodplains and semi-riparian draws and ravines,.....6  
 5b. Valley bottom shrublands restricted to temporarily flooded drainages and flats, slightly to strongly alkaline.....12
- 6a. Woodlands and shrublands restricted to drainages and semi-riparian flats that are dominated by the introduced species *Elaeagnus angustifolia* or *Tamarix* spp. ....7  
 6a. Woodlands and shrublands restricted to drainages and semi-riparian flats that are not dominated by the introduced species *Elaeagnus angustifolia* or *Tamarix* spp. ....8



- 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 introduced *Tamarix* spp..... (*Tamarix* spp. **Semi-Natural Temporarily Flooded Shrubland Alliance\***)  
..... **Invasive Riparian Woodland and Shrubland\*\***
- 8a. Mesic riparian woodlands and shrublands that occur in lower montane and foothill zones.....**9**
- 8b. Mesic woodlands and shrublands that typically occur in riparian zones in the western Great Plains that extend into central Montana along medium to large rivers such as the Missouri River and tributaries. ....**10**
- 9a. Lower montane and foothill riparian woodlands and shrublands associated with mountain ranges of northern Rocky Mountains and Cascades, extending into isolated ranges in central Montana. Woodlands are often dominated by *Populus balsamifera* ssp. *trichocarpa*. Several other tree species 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*, *Oplopanax 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 \*\***
- 9b. Lower montane and foothill riparian woodlands and shrublands associated with mountain ranges of the southern and central Rocky Mountains, which extends into the southern portion of this map zone. Woodlands are often dominated by *Populus angustifolia*. ....  
..... (**Rocky Mountain Lower Montane Riparian Woodland and Shrubland\***)  
..... **Rocky Mountain Montane Riparian Systems \*\***
- 10a. Stands are typically riparian woodlands and shrublands that occur in draws and ravines in the Great Plains and may extend into central Montana. It is often associated with permanent or ephemeral streams and small rivers and may occur on steep northern slopes or within canyon bottoms that do not experience periodic flooding, although soil moisture and topography allow greater than normal moisture conditions compared to the surrounding areas. *Juniperus* spp. (especially *J. scopulorum*), *Acer negundo*, *Fraxinus* spp. or *Ulmus* spp. are typically dominant with *Populus tremuloides* is sometime prevalent. *Piptatherum micranthum*, *Pascopyrum smithii*, and *Carex* spp. are common graminoids.....  
..... (**Western Great Plains Wooded Draw and Ravine \***)  
..... **Western Great Plains Riparian Systems \*\***
- 10b. Riparian woodlands and shrublands of the western Great Plains in central and eastern Montana not restricted to wooded draws and ravines.....**11**
- 11a. This system is found in the floodplains of medium and large rivers of the northwestern Great Plains and may extend into the Dakotas and Canada. Alluvial soils and periodic, intermediate flooding (every 5-25 years) typify this system. Dominant communities within this system range from floodplain forests to wet meadows to gravel/sand flats, however, they are linked by underlying soils and the flooding regime. Dominant species include *Populus balsamifera* ssp. *trichocarpa* or *Populus deltoides* and *Salix* spp. Grass cover underneath the trees is an important part of this system and is a mix of cool-season graminoid species, including *Carex pellita* (= *Carex lanuginosa*), *Panicum virgatum*, *Schizachyrium scoparium*, and *Elymus lanceolatus*.. .... (**Northwestern Great Plains Floodplain \***)  
..... **Western Great Plains Riparian Systems\*\***
- 11b. This system is found in the riparian areas of medium and small rivers and streams throughout the northwestern Great Plains. These are found on alluvial soils in highly variable landscape settings, from deep cut ravines to wide, braided streambeds. Hydrologically, these stands tend to be more flashy with a less developed floodplain than on larger rivers, and typically dry down for some portion of the year. Dominant vegetation shares much with generally drier portions of larger floodplain systems downstream, but overall abundance of vegetation is generally lower. Communities within this system range from riparian

forests and shrublands to gravel/sand flats. Dominant species include *Populus deltoides*, *Populus balsamifera ssp. trichocarpa*, *Salix* spp., *Artemisia cana ssp. cana*, and *Pascopyrum smithii*. These areas are often subjected to heavy grazing and/or agriculture and can be heavily degraded. ....  
 ..... (Northwestern Great Plains Riparian \*)  
 ..... Western Great Plains Riparian Systems\*\*

- 12a. 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**
- 12b. 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 *Artemisia tridentata ssp. wyomingensis*. This system is 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**

### FORESTS AND WOODLANDS

- 13a. Upland forests and woodlands (trees generally with >25% cover) .....14  
 13b. Upland savannas (10-25% cover of trees, generally >3 m tall with a single main stem, and with >20% cover perennial graminoids), shrublands, and shrub-steppe (10-25% cover of shrubs with >20% cover perennial graminoids).....28

#### **Broadleaf Deciduous Forest and Woodland**

- 14a. Broadleaf forests and woodlands or mixed conifer-aspen forests and woodlands (deciduous trees make up 25-100% of the tree canopy). .....15  
 14b. Conifer forests and woodlands (deciduous trees may make up less than 25% cover of the tree canopy).....16
- 15a. Broadleaf forest or woodland typically dominated by *Populus tremuloides* (and possible inclusions of other broadleaf tree species) with less than 25% total tree canopy cover of conifers.....  
 ..... **Rocky Mountain Aspen Forest and Woodland**
- 15b. Mixed conifer-broadleaf forests and woodlands codominated by *Populus tremuloides* 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**

#### **Conifer Forest and Woodland**

- 16a. Subalpine conifer forests and woodlands (spruce-fir zone).....17  
 16b. Montane and foothills conifer forests and woodlands (Douglas-fir – ponderosa pine to foothill zones).....21

#### **Subalpine Conifer Forest and Woodland**

- 17a. Stunted tree clumps, open woodlands, and herb- or dwarf-shrub-dominated openings, occurring above closed forest ecosystems and below alpine communities. Tree clumps dominated by *Pinus albicaulis*, woodlands of *Pinus albicaulis* or *Larix lyallii*. *Abies lasiocarpa*, *Pinus flexilis* and *Picea* may also be present ..... **Northern Rocky Mountain Subalpine Woodland and Parkland**
- 17b. Subalpine conifer forests and woodlands NOT dominated or codominated by *Pinus albicaulis* and/or *P. flexilis*, forming true subalpine forests below treeline, dominated by *Pinus contorta*, *Picea engelmannii* and/or *Abies lasiocarpa*.....18
- 18a. Conifer forests and woodlands strongly dominated by *Pinus contorta* sometimes with *Populus tremuloides* codominating and *Picea engelmannii* and/or *Abies lasiocarpa* present, especially in the subcanopy.....19  
 18b. Conifer forests and woodlands typically dominated or codominated by *Abies lasiocarpa* and/or *Picea engelmannii* sometimes with *Pinus contorta* or *Populus tremuloides* codominating .....20

- 19a. Conifer forests and woodlands strongly dominated by *Pinus contorta* (>2/3 total tree canopy), or with *Populus tremuloides* codominating. These are subalpine forests, (occasionally found in the montane zone), where the dominance of *Pinus contorta* is related to topo-edaphic conditions and nutrient-poor soils and restricted to the “island” mountains in this map zone. 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, and shallow moisture-deficient soils with a significant component of volcanic ash. ....**Rocky Mountain Poor Site Lodgepole Pine Forest**
- 19b. Conifer forests and woodlands strongly dominated by *Pinus contorta* (>2/3 total tree canopy), site characteristics not as above, typically early to mid-seral forest on productive soils. These are subalpine forests where the dominance of *Pinus contorta* is related to fire history and topo-edaphic conditions. Following stand-replacing fires, *Pinus contorta* will rapidly colonize and develop into dense, even-aged stands. Most forests in this ecological system occur as early- to mid-successional forests which developed following fires. This system includes *Pinus contorta*-dominated stands that, while typically persistent for >100-year time frames, may succeed to spruce-fir forests and woodlands in the central Rocky Mountains. ....**Rocky Mountain Lodgepole Pine Forest**
- 20a. Widespread matrix subalpine conifer forests and woodlands of drier environments that are dominated or codominated by *Abies lasiocarpa* and/or *Picea engelmannii*. Stands may extend into montane zone locally in cold air drainage areas. ....**Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland**
- 20b. Large and small patch subalpine conifer forests and woodlands of mesic environments (north aspect toeslopes) that are dominated or codominated by *Abies lasiocarpa* and/or *Picea engelmannii* with mesic understory shrubs such as *Amelanchier alnifolia*, *Rubus parviflorus*, *Vaccinium membranaceum*, *Rhododendron albiflorum*, *Ledum glandulosum*, *Phyllodoce empetrifloris*, and *Salix* spp. Herbaceous species include *Actaea rubra*, *Clintonia uniflora*, *Maianthemum stellatum*, *Cornus canadensis*, *Erigeron eximius*, *Gymnocarpium dryopteris*, *Rubus pedatus*, *Saxifraga bronchialis*, *Tiarella* spp., *Lupinus arcticus* ssp. *subalpinus*, *Valeriana sitchensis*, and graminoids *Luzula glabrata* var. *hitchcockii* or *Calamagrostis canadensis*. Stands may extend into montane zone locally in cold air drainage areas. ....**Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland**

### **Montane and Foothill Conifer Forest and Woodland**

- 21a. Montane conifer forests and woodlands .....22
- 21b. Foothill conifer forests and woodlands .....27

### **Montane Conifer Forest and Woodland**

- 22a. Conifer forests and woodlands strongly dominated by *Pinus contorta* and sometimes codominated by *Populus tremuloides* .....23
- 22b. Conifer forests and woodlands NOT dominated *Pinus contorta*, but may be present with low cover.....24
- 23a. Conifer forests and woodlands strongly dominated by *Pinus contorta* or 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**
- 23b. Conifer forests and woodlands strongly dominated by *Pinus contorta* or with *Populus tremuloides* codominating. These are upper montane to subalpine forests where the dominance of *Pinus contorta* is related to fire history and topo-edaphic conditions and restricted to the “island” mountains in this map zone. Following stand-replacing fires, *Pinus contorta* will rapidly colonize and develop into dense, even-aged stands. Most forests in this ecological system occur as early- to mid-successional forests which developed following fires. 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**

- 24a. Matrix *Pinus ponderosa* dominated woodlands sometimes with inclusions of *Pseudotsuga menziesii* woodlands on cool aspects. *Pinus flexilis*, *Juniperus* spp., or *Populus tremuloides* may be also be present. Stands are restricted to foothills, mountains and hills in the in the southern and central Rocky Mountains extending out on to the mountains and breaks in the western and northwestern plains. ....  
 ..... **Southern Rocky Mountain Ponderosa Pine Woodland**
- 24b. Woodland dominated by *Pseudotsuga menziesii* sometimes with inclusions of other trees such as *Pinus contorta* at higher elevations. If codominated by *Pinus ponderosa*, then stand occurs in northern Rocky Mountains.....**25**
- 25a. Montane conifer forests and woodlands often occurs at the lower treeline immediately above valley grasslands, or sagebrush steppe and shrublands in the central Rocky Mountains and may extend north into the southern portion of this map zone. *Pseudotsuga menziesii* typically dominates, occasionally with *Pinus flexilis* on calcareous substrates, and *Pinus contorta* present 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*. ....  
 ..... **Middle Rocky Mountain Montane Douglas-fir Forest and Woodland (26)**
- 25b. Montane conifer forests and woodlands found in the interior Pacific Northwest to western and north central Montana where it occurs on mountain islands (Snowys). Most occurrences of this system are dominated by a mix of *Pseudotsuga menziesii* and *Pinus ponderosa* (can be one without the other). In central Montana, *Pinus contorta* is a typical seral species. *Picea engelmannii* and *Picea glauca* and their hybrid becomes increasingly common towards the eastern edge of the range. Understories are dominated by graminoids, such as *Pseudoroegneria spicata*, *Calamagrostis rubescens*, *Carex geyeri*, and *Carex rossii*, and may be associated with shrubs, such as *Acer glabrum*, *Physocarpus malvaceus*, *Symphoricarpos albus*, *Spiraea betulifolia*, *Juniperus communis* or *Vaccinium membranaceum* on mesic sites. ....  
 ..... **Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest (26)**
- 26a. 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**
- 26b. Conifer forests and woodlands Not dominated or codominated by *Pseudotsuga menziesii* .....  
 ..... **Unidentified Forest Alliance\*\*\*\***

**Foothill Conifer Forest and Woodland**

- 27a. 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 north into Montana (*Juniperus* spp. may be absent especially in northern stands).....  
 ..... **Rocky Mountain Foothill Limber Pine-Juniper Woodland**
- 27b. Foothill conifer woodlands dominated or codominated by *Pinus flexilis* and/or *Juniperus* spp. with *Pinus ponderosa* codominant ..... **Southern Rocky Mountain Ponderosa Pine Woodland**

**Savannas (open tree canopy)**

- 28a. Savannas with 10-25% cover of trees (generally >3 m tall with a single main stem) over perennial grassland (25% or more herbaceous cover).....**29**
- 28b. Shrub-steppe, shrublands and dwarf-shrublands (trees with less than 10% cover).....**31**
- 29a. Open tree layer typically codominated by *Pinus ponderosa* and *Pseudotsuga menziesii*, but either may dominate sometimes with *Pinus flexilis* present to codominant. Typically, stands have a strong perennial grass layer (>20% cover). Important graminoid species include *Pseudoroegneria spicata*, *Leucopoa kingii*, *Hesperostipa* spp., *Achnatherum* spp., *Festuca idahoensis*, or *Festuca campestris*. Stands occur in the foothills of the northern Rocky Mountains and west to the Modoc Plateau and eastern Cascades Range into southern interior British Columbia, as well as east across Idaho into the eastern foothills of the Montana Rockies, and in the Missouri breaks and island mountains of central Montana.....

- ..... **Northern Rocky Mountain Foothill Conifer Wooded Steppe**
- 29b. Open tree layer dominated by *Pinus ponderosa*, but may have *Pinus flexilis* or *Juniperus* spp. present to codominant. Typically stands have a strong perennial grass layer (>20% cover). Important species include *Festuca arizonica*, *Pseudoroegneria spicata*, *Andropogon gerardii*, *Schizachyrium scoparium*, *Festuca* spp., *Piptatherum micranthum*, and *Bouteloua gracilis*. Stands occur in the foothills of southern and central Rocky Mountain and extend out into the plains often near breaks. ....
- ..... **Southern Rocky Mountain Ponderosa Pine Savanna**
- 30a. Dwarf- or low shrubland or dwarf shrub-steppe ..... **None Identified in this Map Zone**
- 30b. Shrubland or shrub-steppe..... **29**

### SHRUB-STEPPE AND SHRUBLAND

- 31a. Shrub layer is dominated or codominated by big sagebrush (*Artemisia tridentata*). *Artemisia tripartita* or *Purshia tridentata* may also dominate some stands ..... **32**
- 31b. Other taxa dominate or codominate the shrub layer. *Artemisia tridentata* may be present..... **36**

#### Sagebrush Shrublands or Steppe

- 32a. Montane or subalpine (>2000 m elevations) shrubland or shrub-steppe dominated or codominated by *Artemisia tridentata* ssp. *vaseyana*, *A. tridentata* ssp. *spiciformis*, non-riparian *A. cana* ssp. *viscidula*, *A. arbuscula* ssp. *arbuscula* and/or *Purshia tridentata*. *Symphoricarpos* spp. may codominate some stands.....
- ..... **Inter-Mountain Basins Montane Sagebrush Steppe (33)**
- 32b. Foothill shrubland or shrub-steppe dominated or codominated by *Artemisia tridentata* ssp. *tridentata* and/or *Artemisia tridentata* ssp. *wyomingensis*. *Symphoricarpos* spp. or *Purshia tridentata* may codominate some stands..... **34**
- 33a. *Artemisia tridentata* ssp. *vaseyana* typically dominates shrub layer of 10% or more absolute cover and with typically less than 20% total perennial herbaceous cover. ....
- ..... *Artemisia tridentata* ssp. *vaseyana* **Shrubland Alliance**
- 33b. *Artemisia arbuscula* ssp. *arbuscula* dominated shrubland.....
- ..... *Artemisia arbuscula* ssp. *arbuscula* **Dwarf-Shrubland Alliance\*\*\*\***
- 34a. *Artemisia tridentata* ssp. *tridentata* and/or *Artemisia tridentata* ssp. *wyomingensis* 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**
- 34b. *Artemisia tridentata* ssp. *tridentata*, *Artemisia tridentata* ssp. *xericensis*, *Artemisia tridentata* ssp. *wyomingensis*, *Artemisia tripartita* ssp. *tripartita*, and/or *Purshia tridentata* 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 (35)**
- 35a. *Purshia tridentata* dominates shrub layer of 10% or more absolute cover and with typically greater than 20% total perennial herbaceous cover. *Artemisia tridentata* may be present, but not codominant. ....
- ..... *Purshia tridentata* **Shrub Herbaceous Alliance**
- 35b. *Purshia tridentata* dominates shrub layer of 10% or more absolute cover and with typically less than 20% total perennial herbaceous cover. *Artemisia tridentata* may be present, but not codominant. ....
- ..... *Purshia tridentata* **Shrubland Alliance\*\*\*\***

#### Non-Sagebrush Shrublands and Steppe

- 36a. Shrubland or shrub-steppe of subalpine to foothill zones ..... **37**
- 36b. Shrubland of the northwestern Great Plains that extend into this map zone. These shrublands occur in relatively mesic areas such as along upper terraces of rivers and streams, gently inclined slopes near

breaklands, and upland sandy loam areas throughout its range. Stands are dominated by shrub species such as *Amelanchier alnifolia*, *Rhus trilobata*, *Symphoricarpos* spp., *Shepherdia argentea*, *Crataegus douglasii*, *Dasiphora fruticosa* ssp. *floribunda*, and dwarf-shrubs such as *Juniperus horizontalis*. .....  
 ..... **Northwestern Great Plains Shrubland**

37a. This shrubland ecological system is found in the upper montane and subalpine zones in the northern Rocky Mountains. It occurs within the zone of near-continuous forest of the upper montane and lower subalpine. They are typically initiated by fires and will persist on sites for long periods because of repeated burns and changes in the presence of volatile oils in the soil which impedes tree regeneration. *Menziesia ferruginea*, *Rhamnus alnifolia*, *Ribes lacustre*, *Rubus parviflorus*, *Alnus viridis*, and *Vaccinium membranaceum* are dominant shrubs. *Xerophyllum tenax*, *Chamerion angustifolium*, and *Pteridium aquilinum* are important forbs, reflecting the mesic nature of many of these shrublands. ....  
 ..... **Northern Rocky Mountain Subalpine Deciduous Shrubland**

37b. This shrubland ecological system is found in the lower montane and foothill regions from the Columbia Basin north and east into the northern Rockies, but may extend into the western extent of this map zone. These shrublands typically occur below lower treeline, within the matrix of surrounding low-elevation grasslands and sagebrush shrublands and rarely up into the dry sites of the subalpine zone. The shrublands are usually found on steep slopes of canyons and in areas with some soil development. These communities develop near talus slopes, at the heads of dry drainages, and toeslopes in the moist shrub-steppe and steppe zones. *Physocarpus malvaceus*, *Prunus emarginata*, *Prunus virginiana*, *Rosa* spp., *Rhus glabra*, *Acer glabrum*, *Spiraea betulifolia*, *Amelanchier alnifolia*, *Symphoricarpos albus*, and *Holodiscus discolor* are common shrubs. In moist areas *Crataegus douglasii* can be common. *Festuca idahoensis*, *Festuca campestris*, *Calamagrostis rubescens*, *Carex geyeri*, *Koeleria macrantha*, *Pseudoroegneria spicata*, and *Poa secunda* are the most important grasses. *Achnatherum thurberianum* and *Leymus cinereus* can be locally important.....  
 ..... **Northern Rocky Mountain Montane-Foothill Deciduous Shrubland**

**KEY B: Herbaceous Ecological Systems and Alliances**  
**(Herbaceous layer dominant >10% cover with low woody cover <10%)**

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

**Wetland Herbaceous**

- 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. Site more is depressional wetland in of the western Great Plains .....5
- 4b. 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\*\*\***
- 5a. Site occurs in upland depressional rainwater basin that is characterized by the presence of an impermeable soil layer and is usually recharged by rainwater and nearby runoff. The system is rarely linked to outside groundwater sources and does not have an extensive watershed. Ponds and lakes associated with this system experience periodic drawdowns during drier seasons and years, and are often replenished by spring rains. *Eleocharis* spp., *Hordeum jubatum*, along with forbs such as *Coreopsis tinctoria*, *Symphotrichum subulatum*, and *Polygonum pennsylvanicum* are common vegetation in the wetter and deeper depressions, while *Pascopyrum smithii* and *Buchloe dactyloides* are more common in shallow depressions in rangeland.....**(Western Great Plains Closed Depression Wetland\*)**  
..... **Western Great Plains Depressional Wetland Systems \*\***
- 5b. Site occurs in lowland depressions with strongly saline soils that cause both the shallow lakes and depressions and the surrounding areas to be more brackish. Salt encrustations can occur on the surface in some examples of this system, and the soils are severely affected and have poor structure. Species that typify this system are salt-tolerant and halophytic species such as *Distichlis spicata*, *Sporobolus airoides*, and *Hordeum jubatum*. During exceptionally wet years, an increase in precipitation can dilute the salt concentration in the soils of some examples of this system which may allow for less salt-tolerant species to occur. Communities found within this system may also occur in floodplains (i.e., more open depressions), but probably should not be considered a separate system unless they transition to areas outside the immediate floodplain.....**(Western Great Plains Saline Depression Wetland\*)**  
..... **Western Great Plains Depressional Wetland Systems \*\***

**Upland Herbaceous**

- 6a. Herbaceous cover dominated by annual graminoids or annual and biennial forbs .....7
- 6b. Herbaceous cover dominated by perennial species .....8
- 7a. Herbaceous cover dominated by annual species of brome grass (typically *Bromus tectorum*, but including *Bromus japonicus* and *Bromus 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 *Agropyron cristatum*, *Alopecurus geniculatus*, *Agrostis stolonifera*, *Bromus inermis*, *Centaurea* sp, *Cirsium arvense*, *Dactylis*

	<i>glomerata</i> , <i>Euphorbia esula</i> , <i>Lepidium latifolium</i> , <i>Melilotus</i> spp., <i>Poa pratensis</i> , <i>Phleum pratense</i> , <i>Thinopyrum intermedium</i> , and other introduced forage species.....	<b>Invasive Perennial Grassland and Forbland</b>
8b.	Herbaceous cover dominated by native species .....	<b>9</b>
9a.	Alpine herbaceous vegetation dominated by short graminoids and forbs forming a turf .....	<b>Rocky Mountain Dry Tundra</b>
9b.	Subalpine, montane, foothill, valley and plains vegetation.....	<b>10</b>
10a.	Subalpine and montane vegetation.....	<b>11</b>
10b.	Lower montane, foothill, mesa and lower elevation grasslands found in basins and plains .....	<b>12</b>
11a.	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</i> ssp. <i>floribunda</i> and <i>Symphoricarpos</i> spp. are occasionally present. ....	<b>Rocky Mountain Subalpine Mesic Meadow</b>
11b.	Upper montane to subalpine grasslands from the Northern Rocky Mountains and extends east from the Rocky Mountain Front to the isolated mountains of central Montana. These dry grasslands range from small meadows to large open parks surrounded by conifer trees, but lack tree cover within them. Typical dominant species include <i>Leymus innovatus</i> (= <i>Elymus innovatus</i> ), <i>Koeleria macrantha</i> , <i>Festuca campestris</i> , <i>Festuca idahoensis</i> , <i>Festuca viridula</i> , <i>Achnatherum occidentale</i> (= <i>Stipa occidentalis</i> ), <i>Achnatherum richardsonii</i> (= <i>Stipa richardsonii</i> ), <i>Bromus inermis</i> ssp. <i>pumpellianus</i> (= <i>Bromus 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>Carex obtusata</i> , and <i>Carex scirpoidea</i> . Important forbs include <i>Lupinus argenteus</i> var. <i>laxiflorus</i> , <i>Potentilla diversifolia</i> , <i>Potentilla flabellifolia</i> , <i>Fragaria virginiana</i> , and <i>Chamerion angustifolium</i> (= <i>Epilobium angustifolium</i> ). This system is similar to Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland (below), but is found at higher elevations and is more often composed of <i>Festuca</i> spp. and <i>Achnatherum</i> and/or <i>Hesperostipa</i> spp. (= <i>Stipa</i> spp.) with additional floristic components of more characteristic of subalpine taxa.....	<b>Northern Rocky Mountain Subalpine – Upper Montane Grassland</b>
12a	Lower montane to foothill elevation grasslands found in the mountains and large valleys of northern Rocky Mountains and extends east from the Rocky Mountain Front to the isolated mountains of central Montana. These grasslands are floristically similar, particularly in dominant grasses, to Inter-Mountain Basins Big Sagebrush Steppe, but lack a big sagebrush shrub layer. Stands range from small meadows to large open parks surrounded by conifers in the lower montane zone, to extensive foothill and valley grasslands below the lower treeline. Stands are dominated by cool-season perennial bunch grasses and forbs (>25% cover), sometimes with a sparse (<10% cover) shrub layer. <i>Pseudoroegneria spicata</i> , <i>Festuca campestris</i> , <i>Festuca 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>Achnatherum richardsonii</i> , <i>Hesperostipa curtiseta</i> , <i>Koeleria macrantha</i> , <i>Leymus cinereus</i> , <i>Elymus trachycaulus</i> , <i>Bromus inermis</i> ssp. <i>pumpellianus</i> (= <i>Bromus pumpellianus</i> ), <i>Achnatherum occidentale</i> (= <i>Stipa occidentalis</i> ), <i>Pascopyrum smithii</i> , and other graminoids such as <i>Carex filifolia</i> and <i>Danthonia intermedia</i> . Important exotic grasses include <i>Phleum pratense</i> , <i>Bromus inermis</i> , and <i>Poa pratensis</i> . Scattered shrubs present may include <i>Amelanchier alnifolia</i> , <i>Eriogonum heracleoides</i> , <i>Rosa</i> spp., <i>Symphoricarpos</i> spp., <i>Juniperus communis</i> , <i>Artemisia tridentata</i> . Common associated forbs include <i>Geum triflorum</i> , <i>Galium boreale</i> , <i>Campanula rotundifolia</i> , <i>Antennaria microphylla</i> , <i>Geranium viscosissimum</i> , and <i>Potentilla gracilis</i> . These are extensive grasslands, not grass-dominated patches within the sagebrush shrub-steppe ecological system. <i>Festuca campestris</i> is easily eliminated by grazing and does not occur in all areas of this system.....	<b>Northern Rocky Mountain Lower Montane Foothill and Valley Grassland</b>
12b	Grasslands of the northwestern Great Plains.....	<b>13</b>



- 13a Stands occur as small patch grasslands found on sand deposits within a northern mixed grass matrix. These stands represent peripheral example of the typically large patch sand prairies found in the Nebraska Sandhills. Species composition is similar to the large-patch stands, but lacks tall grasses such as *Calamovilfa longifolia* and *Andropogon hallii* and is dominated by mid-grasses such as *Hesperostipa comata*, *Carex inops ssp. heliophila*, and *Sporobolus cryptandrus*..... **Western Great Plains Sand Prairie**
- 13b. Widespread mixed-grass prairie that extends into high plains of eastern and central Montana from northeast Wyoming and Nebraska, the Dakotas and Canada. Cool-season grasses to be more important typically dominate the ground cover (greater than 50% cover). Characteristic species include *Pascopyrum smithii*, *Nassella viridula*, *Bouteloua gracilis*, *Hesperostipa comata*, and *Carex filifolia*. *Festuca campestris* and *Festuca idahoensis* may be more abundant in the north and foothill/ montane grassland transition areas.....  
 ..... **Northwestern Great Plains Mixedgrass Prairie**