Field Key to Ecological Systems and Target Alliances of LandFire Map Zones 25 and 26 (Northern Chihuahuan Desert)

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*photo of Southern Quitman Mountains by John Karges, TNC

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Introduction

The following keys to NatureServe ecological systems and selected US-NVC vegetation alliances are adapted from keys developed for the Southwest Regional Gap Analysis project for Arizona and New Mexico. The keys cover the areas found in MRLC & LANDFIRE map zones: 25, & 26 (Figure 1). 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 interior southwest United States. 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.

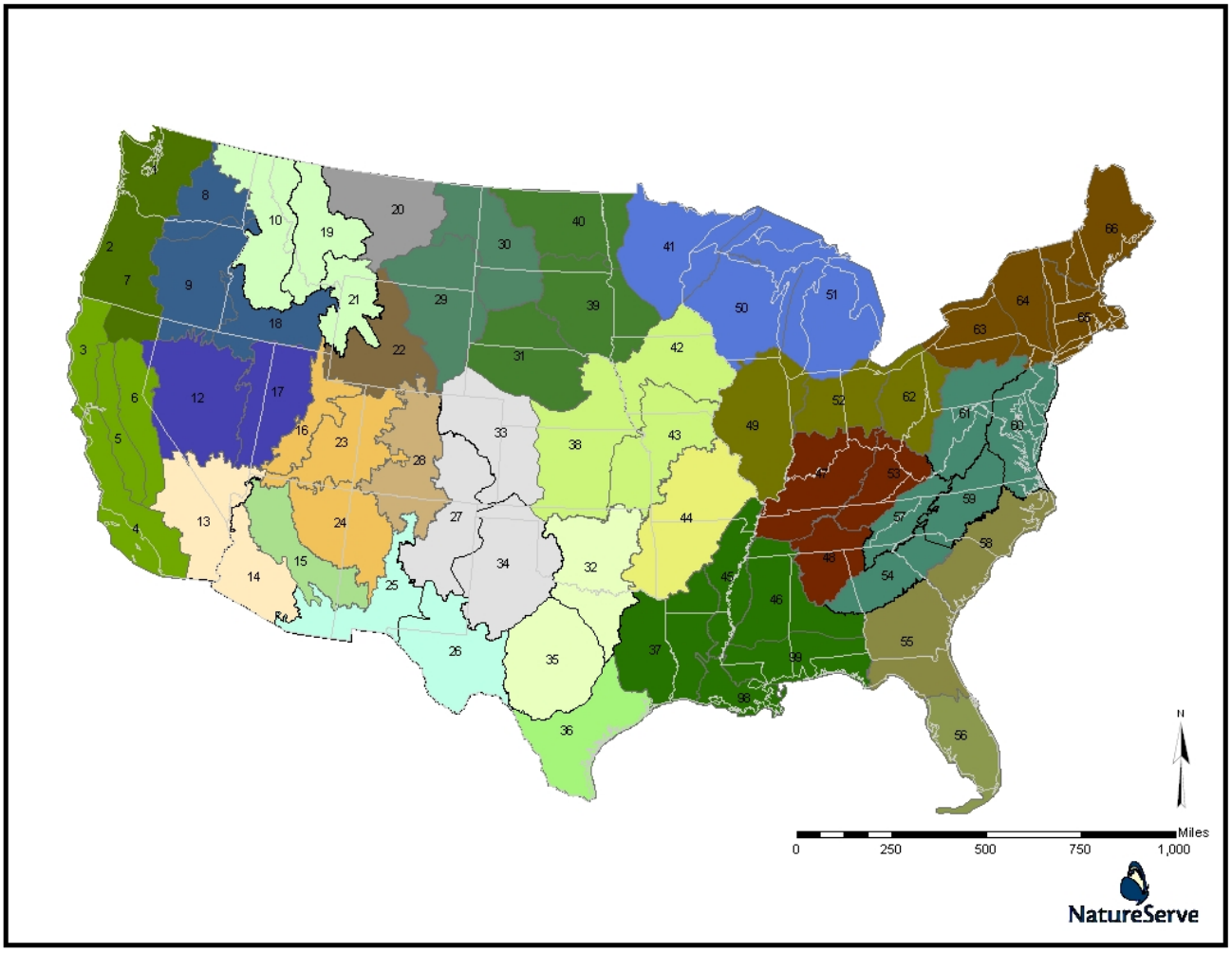

Figure 1. LANDFIRE map zone clusters with keys to ecological systems and selected alliances.

The field keys have been organized into map zone 'clusters' that are similar ecologically and geographically (Figure 1). This key is for ecological systems and mappable alliances that occur in the Northern Chihuahuan Desert (map zones 25 and 26). Peripheral ecological systems common in adjacent map zones are included in the keys to facilitate inclusiveness.

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 (and 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). Ecological Systems do not include Latin species names in them, and always start with a biogeographic region (e.g., Colorado Plateau Mixed Low Sagebrush Shrubland). If an ecological system name is followed by a number in parentheses, the couplet so numbered is to alliances that are part of the system and which may be mappable.

All 6 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 into riparian or wetland woodlands or shrublands, then to upland deciduous forest/woodlands, then to upland coniferous forests/woodlands, then savannas, then shrublands or 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 alliance will have 2 or more codominant species, which may or may not be present in all stands. Some ecological system types 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 to100% 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 are 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 or disturbed and dominated by introduced annual and biennial forbs. Natural vegetation types are no longer recognizable. Typical species that dominate these areas include *Acroptilon repens, Leucanthemum vulgare, Circium arvense, C. vulgare, Euphorbia esula, Lepidium latifolium, Carduus nutans, Centaurea spp (melitensis, solstitialis), Kochia scoparia, Halogeton glomeratus, Melilotus officinalis*, *Trifolium repens* and *Erodium cicutarium.*
SEMI-NATURAL / ALTERED VEGETATION (Continued)	
Introduced Upland Vegetation – Annual Grassland	Land cover is significantly altered or disturbed and dominated by introduced annual grasses. Natural vegetation types are no longer recognizable. Typical species include *Bromus catharticus, B. japonicus, B. rigidus, B. rubens, B. tectorum, Eragrostis cilianensis*, and *Schismus barbatus*.
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 *Bromus* spp. (e.g., *madritensis, diandris, hordeaceus), Eschschlozia californica, Aira caryophyllea, Lasthenia spp., Castilleja spp., Avena spp, Mesembryanthemum, Malephora,* and/or *Carpobrotus*, commonly referred to as 'iceplant.' The native shrubs *Ambrosia chamissonis, Eriogonum latifolium,* and/or *Abronia latifolia* may be present as emergents. *Poa douglasii* 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 *Agropyron cristatum, Eragrostis lehmanniana, E. curvula, Poa bulbosa, Bromus inermis, Phleum pratense*, and *Poa pratensis*. Forbs may include: *Centaurea spp., Cirsium arvense, Euphorbia esula, Lepidium spp., Melilotus spp*.
Introduced Riparian Vegetation	Land cover is altered/disturbed and dominated by introduced woody vegetation (woodlands and shrublands). Typical riparian trees and shrubs include *Elaeagnus angustifolia, Tamarix* spp., *Triadica sebifera,* etc.
Introduced Wetland Vegetation	Land cover is altered/disturbed and dominated by introduced wetland vegetation. Species may include *Lythrum salicaria, Phalaris arundancea, Phragmites australis*, 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.

Key to LandFire Map Zones 25 and 26 Ecological Systems and Target Alliances (Sky Islands region of Southeast Arizona, Northern Chihuahuan Desert, Trans-Pecos of Texas, and Middle Rio Grande Valley of New Mexico)

This key is intended for identifying Terrestrial Ecological Systems and selected alliances that are found in the Northern Chihuahuan Desert and adjacent Apache Highlands of Southwestern New Mexico and Southeastern Arizona (Mapping Zone # 25), as well as in the Middle Rio Grande Valley of New Mexico and Trans-Pecos of Texas (Mapping Zone # 26). Several peripheral and small patch Ecological Systems were added to the key for comparison, althought they may not be mapped by LandFire. Additional alliance couplets are to proposed mappable or target alliances and are not intended to be comprehensive.

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

a indicates a 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 ***(b)***

b indicates a broader LANDFIRE Map Unit (system group).

c **indicates a** typically small patch ecological system type not being mapped by LANDFIRE.

d **indicates an** alliance not considered to be mappable for LANDFIRE purposes, but included to help characterize the vegetation.

e indicates a type that is peripheral map zones 25 and 26 and would only occurs in transistion areas near boundaries of these map zones.

1a. Total woody canopy cover is greater than or equal to 10%, or stand is dominated by *Larrea tridentata* and *Ambrosia dumosa* and woody canopy cover is greater than 2%..... **GO TO KEY A: Woodland, Shrubland, or Savanna Systems and Alliances**

1b. Total woody canopy cover generally less than 10% **2**

2a. Total herbaceous canopy cover generally 10% or more and dominated by perennial vegetation. ..... **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. Sparsely vegetated coppice dunes, sandsheet, or active and/or partially stabilized dunes with eolian processes predominating 4

3b. Land cover not as above..... 5

4a. Sparse desert scrub characterized by vegetated coppice dunes and sandsheets found in the Chihuahuan Desert. Usually dominated by *Prosopis glandulosa* but includes *Atriplex canescens, Ephedra torreyana, Ephedra trifurca, Poliomintha incana*, and *Rhus microphylla* coppice sand scrub with 0-15% total vegetation cover. *Yucca elata, Gutierrezia sarothrae*, and *Sporobolus flexuosus* are commonly present. Active eolian processes are diaganostic of this ecological system ..... **Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub**

4b. Land cover is active and/or partially vegetated (stabilized) dunes or sand sheets. Common at White Sand National Monument and Monahan Dunes State Park ..... (**North American Warm Desert Active and Stabilized Dune**[a]**)** ..... **North American Warm Desert Sparsely Vegetated Systems**[b]

5a. Sparse desert land cover that generally occurs in the Chihuahuan Desert, south of Socorro in the Rio Grande River Valley **6**

5b. Sparse land cover that generally occurs in the Colorado Plateau and which may occur in the Middle Rio Grande Valley, north of Soccoro **12**

6a. Land cover is in a closed depression, bottomland, or drainage **7**

6b. Land cover is upland dune, mudstone or shale badlands, volcanic rock outcrop or cinder site **8**

7a. Land cover is a barren to sparsely vegetated playa ..... (**North American Warm Desert Playa**[a]**)**
..... **North American Warm Desert Sparsely Vegetated Systems**[b]

7b. Land cover is restricted to intermittently flooded drainages. Vegetation often includes denser clumps of discontinuous vegetation (shrubs, grasses and occasional trees), but overall washes are typically sparsely vegetated. Common species may include *Acacia greggii, Brickellia laciniata, Baccharis sarothroides, Chilopsis linearis, Fallugia paradoxa, Hymenoclea salsola, H. monogyra, Juglans microcarpa, Prosopis spp., Psorothamnus spinosus, Prunus fasciculata, Rhus microphylla, Salazaria mexicana* or *Sarcobatus vermiculatus*. Herbaceous vegetation such as perennial grasses, *Distichlis spicata* or *Sporobolus airoides* may also dominate wash..... (**North American Warm Desert Wash**[a]**)**
..... **North American Warm Desert Sparsely Vegetated Systems**[b]

8a. Land cover is volcanic in origin (includes lava, cinder, and ash deposits) such as malpais south of Socorro and elsewhere in map zones 25 and 26..... (**North American Warm Desert Volcanic Rockland**[a]**)**
..... **North American Warm Desert Sparsely Vegetated Systems**[b]

8b. Land cover is not volcanic in origin **9**

9a. Land cover is consolidated rock (cliffs, outcrops, barren mountain tops) **10**

9b. Land cover is unconsolidated material **11**

10a. Land cover is largely exposed sedimentary bedrock and scree found along the southern and eastern escarpments of the Colorado Plateau and adjacent canyon and plateaus. It typically occurs below montane elevation zone (usually<2000 m). If found in these map zones, this system would be restricted to the northwestern edge of MZ 25 ..... (**Colorado Plateau Mixed Bedrock Canyon and Tableland**[a, e]**)**
..... **Inter-Mountain Basins Sparsely Vegetated Systems**[b]

10b. Land cover is non-volcanic consolidated rock (cliffs, outcrops, barren mountain tops) .....
..... (**North American Warm Desert Bedrock Cliff and Outcrop** [a]**)**
..... **North American Warm Desert Sparsely Vegetated Systems**[b]

11a. Land cover is eroded shale or clay hills (may not occur in Chihuahuan Desert) .....
..... (**North American Warm Desert Badland**[a]**)**
..... **North American Warm Desert Sparsely Vegetated Systems**[b]

11b. Land cover is wind swept plains and flats with a surface layer of pebbles. Total vegetation cover is low (<10%) excepting ephemeral annual cover following wet year precipitation events. .....
..... (**North American Warm Desert Pavement** [a]**)**
..... **North American Warm Desert Sparsely Vegetated Systems**[b]

12a. Barren and typically sparsely vegetated alpine substrates. Very uncommon in MZ 25, if occurs at all, and absent from MZ 26. ..... **13**

12b. Barren and sparsely vegetated substrates NOT alpine **14**

13a. Land cover is mostly exposed rock (usually > 90% cover of either bedrock, boulders or scree).
..... (**Rocky Mountain Alpine Bedrock and Scree**[a]**)**
..... **Rocky Mountain Alpine/Montane Sparsely Vegetated Systems**[b]

13b. Land cover has significant amounts of vascular herbaceous vegetation (typically cushion plants) may have greater than 10% total vegetation cover and less than 90% cover exposed rock.
..... **Rocky Mountain Alpine Fell field**

14a. Land cover is in a closed depression, bottomland, or drainage **15**
14b. Land cover is mudstone or shale badlands, volcanic rock outcrop or cinder site.....**16**

15a. Land cover is a barren to sparsely vegetated playa. If found in these map zones, this system would be restricted to the northwestern edge of MZ 25.....(**Inter-Mountain Basins Playa[a,e]**)
..... **Inter-Mountain Basins Sparsely Vegetated Systems [b]**
15b. Land cover is restricted to drainages with a variety of sparse or intermittent or patchy vegetation including *Sarcobatus vermiculatus, Ericameria nauseousa, Fallugia paradoxa,* or *Grayia spinosa.* Herbaceous vegetation such as perennial grasses, *Distichlis spicata* or *Sporobolus airoides,* may also dominate wash. If found in these map zones, this system would be restricted to the northwestern edge of MZ 25 .....
..... (**Inter-Mountain Basins Wash[c]**)
..... **Inter-Mountain Basins Sparsely Vegetated Systems[b]**

16a. Land cover is volcanic substrate (includes lava, cinder, ash deposits). If found in these map zones, this system would be restricted to the northwestern edge of MZ 25 .....
..... (**Inter-Mountain Basins Volcanic Rock and Cinder Land[a]**)
..... **Inter-Mountain Basins Sparsely Vegetated Systems[b]**
16b. Land cover is not volcanic substrate. **17**

17a. Land cover is consolidated rock (cliffs, outcrops).....**18**
17b. Land cover is unconsolidated material.....20

18a. Land cover is largely exposed bedrock and scree found in the Southern Rocky Mountains into central New Mexico such as the Sacramento Mountains (generally above 2000m elevation) .....
..... (**Rocky Mountain Cliff, Canyon and Massive Bedrock[a]**)
.....**Rocky Mountain Alpine/Montane Sparsely Vegetated Systems[b]**
18a. Land cover is largely exposed bedrock and scree that generally occurs below 2000m elevation **19**

19a. Land cover is largely exposed sedimentary bedrock and scree found in the canyon and plateaus within the Colorado Plateau. It typically occurs below montane elevation zone (~<2000 m). If found in these map zones, this system would be restricted to the northwestern edge of MZ 25 .....
.....(**Colorado Plateau Mixed Bedrock Canyon and Tableland[a, e]**)
..... **Inter-Mountain Basins Sparsely Vegetated Systems[b]**
19b. Land cover is exposed bedrock and scree is widespread in the western Great Plains, which includes the Middle Rio Grande Valley generally north of Soccoro and east of the Rio Grande River. If found in these map zones, this system would be restricted to the eastern edge of MZ 25 and northern edge of MZ 26 in transition zone with Great Plains.....(**Western Great Plains Cliff and Outcrop[a, e]**)
.....**Western Great Plains Sparsely Vegetated Systems [b, e]**

20a. Land cover is eroded shale or clay hills ..... (**North American Warm Desert Badland[a]**)
.....**North American Warm Desert Sparsely Vegetated Systems[b]**
20b. Land cover is barren, but not as above (review land use and disturbed classes)..... **Barren**

KEY A: Woodland or Shrubland Systems and Alliances
(Woody cover > 10% cover present)

1a. Woodlands and/or shrublands restricted to drainages, floodplains, semi-riparian flats, saline basins, springs or seeps ..... **Key A.1**
1b. Woodlands and/or shrublands of upland sites ..... **Key A.2**

KEY A.1: Riparian or Wetland Associated Woodland or Shrubland Systems and Alliances
(Woody cover > 10% cover present)

1a. Land cover is restricted to intermittently flooded drainages with vegetation forming an intermittent to continuous linear band along the sides of the wash. Overall total vegetation cover is relatively sparse (~10%), but patches may greatly exceed 10% cover. **2**
1b. Not as above **3**

2a. Vegetation restricted to drainages in portions of the Middle Rio Grande Valley (north of Soccoro), with a variety of sparse, intermittent, or patchy shrubs including *Sarcobatus vermiculatus, Ericameria nauseousa, Fallugia paradoxa,* or *Grayia spinosa.* Herbaceous vegetation such as perennial grasses, *Distichlis spicata* or *Sporobolus airoides,* may also dominate wash. If found in these map zones, this system would be restricted to the northwestern portion of MZ 25 ..... (**Inter-Mountain Basins Wash**[c]**)**
..... **Inter-Mountain Basins Sparsely Vegetated Systems**[b]
2b. Vegetation of desert drainages throughout the remainder of MZ 25 and 26, with vegetation including *Acacia greggii, Brickellia laciniata, Baccharis sarothroides, Chilopsis linearis, Fallugia paradoxa, Hymenoclea salsola, H. monogyra, Juglans microcarpa, Prosopis spp., Psorothamnus spinosus, Prunus fasciculata, Rhus microphylla,* or *Salazaria mexicana*..... (**North American Warm Desert Wash**[a]**)**
..... **North American Warm Desert Sparsely Vegetated Systems**
3a. Woodlands and shrublands of higher elevation mountain sites, generally >2600 m (upper montane-subalpine-alpine). If found in these map zones, restricted to high elevations. **4**
3b. Woodlands and shrublands of middle and lower elevations, generally <2600 m (lower montane to valley floor) **5**

4a. Woodlands restricted to drainages, steam terraces, semi-riparian flats and spring or seep fed slopes.. .....
.....(**Rocky Mountain Subalpine - Montane Riparian Woodland**[a]**)**
.....**Rocky Mountain Subalpine/Upper Montane Riparian Systems**[b]
4b. Shrublands restricted to drainages, stream terraces, semi-riparian flats and spring or seep fed slopes. Species of *Salix*, *Alnus* or *Betula* are commonly present.....
..... (**Rocky Mountain Subalpine - Montane Riparian Shrubland**[a]**)**
.....**Rocky Mountain Subalpine/Upper Montane Riparian Systems**[b]

5a. Lower montane woodlands or shrublands restricted to drainages and semi-riparian flats **6**
5b. Lower elevation woodlands or shrublands restricted to drainages and semi-riparian flats in the desert and plains **7**

6a. Woodlands or shrublands found in lower montane zone riparian sites throughout the Rocky Mountain and Colorado Plateau regions within a broad elevation range from approximately 900 to 2800 m. Restricted to the northern portion of MZ 25, it may occur along upper tributaries of the middle to upper Rio Grande River. This system often occurs as a mosaic of multiple communities that are tree-dominated with a diverse shrub component. Dominant trees often include *Populus angustifolia*, with *Acer negundo, Populus balsamifera, P. deltoides, P. fremontii, Pseudotsuga menziesii, Picea pungens, Salix amygdaloides,* or *Juniperus scopulorum* present to co-dominant .....
..... (**Rocky Mountain Lower Montane Riparian Woodland and Shrubland**[a]**)**
.....**Rocky Mountain Montane Riparian Systems** [b]

6b. Woodlands or shrublands of mountain canyons and valleys of southern Arizona and New Mexico, West Texas and adjacent Mexico, on Sky Island mountains north to the Colorado Plateau. It consists of mid- to upper elevation (1100-1800 m) riparian corridors along perennial and seasonally intermittent streams. The vegetation is a mix of riparian woodlands and shrublands. Dominant trees include *Populus angustifolia, P. deltoides ssp. wislizeni, P. fremontii, Platanus wrightii, Juglans major, Fraxinus velutina,* and *Sapindus saponaria*. Shrub dominants include *Salix exigua, Prunus* spp., *Alnus oblongifolia,* and *Baccharis salicifolia*. ..... (**North American Warm Desert Lower Montane Riparian Woodland and Shrubland[a]**) ..... **North American Warm Desert Riparian Systems [b]**

7a. Woodlands and/or shrublands of riparian areas of medium and small rivers and streams. Restricted to drainages and riparian to semi-riparian flats throughout the western Great Plains and may extend into the eastern and northern portions of MZ 25 and MZ 26.....**8**

7b. Woodlands and shrublands restricted to low-elevation (<1200 m) riparian corridors along medium to large perennial streams throughout canyons and the desert valleys sometimes extending out on adjacent semi-riparian flats of the southwestern United States and adjacent Mexico, including the lower Rio Grande and Pecos rivers.....**9**

8a. Woodlands and/or shrublands of riparian areas of medium and small rivers and streams found throughout the western Great Plains, and which may extend into the northern and eastern portions of MZ 25 and MZ 26. It is likely most common in the Shortgrass Prairie but extends west as far as the tributaries of middle and upper Rio Grande in New Mexico. It is found on alluvial soils in highly variable landscape settings, from deep cut ravines to wide, braided streambeds. Hydrologically, these sites tend to be flashier with less developed floodplains than on larger rivers, and typically dry down completely 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, Salix* spp., *Artemisia cana* ssp. *cana, Pascopyrum smithii, Sporobolus cryptandrus, and Schizachyrium scoparium.* These areas are often subjected to heavy grazing and/or agriculture and can be heavily degraded. *Tamarix* spp. and less desirable grasses and forbs can invade degraded stands. .... **(Western Great Plains Riparian Woodland and Shrubland [a, e])** ..... **Western Great Plains Floodplain Systems[b, e]**

8b. Woodlands and/or shrublands of the floodplains of medium and large rivers of the western Great Plains. Alluvial soils and periodic, intermediate flooding (every 5 to 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 deltoides* and *Salix* spp. Grass cover underneath the trees is an important part of this system and is a mix of tallgrass species, including *Panicum virgatum* and *Andropogon gerardii*. *Tamarix* spp. and less desirable grasses and forbs can invade degraded areas within the floodplains. ..... (**Western Great Plains Floodplain[d, e]**) ..... **Western Great Plains Floodplain Systems[b, e]**

9a. Woodlands and shrublands (thicket) restricted to drainages and semi-riparian flats that are dominated by species of *Prosopis*.....(**North American Warm Desert Riparian Mesquite Bosque[a]**) .....**North American Warm Desert Riparian Systems [b] (10)**

9b. Woodlands and shrublands restricted to drainages and semi-riparian flats that are NOT dominated by species of *Prosopis.*.....**11**

10a. Woodlands and shrublands restricted to drainages and semi-riparian flats that are dominated by *Prosopis velutina* ..... (***Prosopis velutina*** **Temporarily Flooded Shrubland Alliance[d]**) ..... **North American Warm Desert Riparian Systems [b]**

10b. Woodlands and shrublands restricted to drainages and semi-riparian flats that are dominated by *Prosopis glandulosa* .....(***Prosopis glandulosa*** **Temporarily Flooded Woodland Alliance[d]**) ..... **North American Warm Desert Riparian Systems [b]**

11a. Woodlands and/or shrublands, sometimes occurring as a mosaic, in low-elevation (<1200 m) riparian corridors along medium to large perennial streams throughout canyons and desert valleys of the southwestern United States and adjacent Mexico, including the lower Rio Grande River within the map zones. Dominant trees include *Acer negundo, Fraxinus velutina, Populus fremontii, Salix gooddingii, S. lasiolepis, Celtis laevigata var. reticulata*, and *Juglans major*. Shrub dominants include *Salix geyeriana, Shepherdia argentea*, and *Salix exigua*. . (**North American Warm Desert Riparian Woodland and Shrubland**[a]) ..... **North American Warm Desert Riparian Systems** [b]

11b. Shrublands occurring on semi-riparian flats and on saline/alkaline plains and basins, sometimes encircling playas or on stream terraces..... **12**

12a. Open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus*. Absent from MZ 26, but widespread in the Intermountain Basins region, including the middle Rio Grande Valley and extending onto the western Great Plains. *Atriplex canescens, A. confertifolia*, or *Krascheninnikovia lanata* may be present to codominant. Commonly occurs on saline/alkaline plains and basins, sometimes encircling playas or on stream terraces..... **Inter-Mountain Basins Greasewood Flat**

12b. Shrubland is not dominated or co-dominated by *Sarcobatus vermiculatus*. **13**

13a. Shrubland is dominated or co-dominated by one or more species of *Atriplex* **14**

13b. Upland vegetation ..... **Key A.2**

14a. Widespread desert scrub typical of saline basins of the Sonoran and Mojave desert and limited to the western edge of MZ 25. Vegetation is typically composed of one or more *Atriplex* species such as *Atriplex canescens, A. obovata*, or *A. polycarpa.* Characteristic species of the Chihuahuan Desert, such as *Flourensia cernua* are absent. Graminoid species may include *Sporobolus airoides, Pleuraphis mutica*, or *Distichlis spicata* with variable cover..... **Sonoran-Mojave Mixed Salt Desert Scrub** [e]

14b. Desert scrub found in areas other than the western edge of MZ 25. ..... **15**

15a. Desert scrub of saline basins in the Chihuahuan Desert, typically composed of one or more *Atriplex* species such as *Atriplex canescens, A. obovata*, or *A. polycarpa* along with species of *Allenrolfea, Flourensia, Salicornia, Suaeda*, or other halophytic plants. Graminoid species may include *Sporobolus airoides, Pleuraphis mutica*, or *Distichlis spicata* with variable cover... ..... **Chihuahuan Mixed Salt Desert Scrub (16)**

15b. Open to moderately dense shrublands typical of saline basins, alluvial slopes and plains across the Intermountain western U.S and extends into the middle Rio Grande Valley and southern Great Plains. This is the typical saltbush dominated shrubland of these situations across the Intermountain western U.S Vegetation is typically composed of one or more *Atriplex* species such as *Atriplex canescens, Atriplex confertifolia* or *Atriplex obovata*, Characteristic desert species such as *Larrea tridentata*, and *Flourensia cernua* should not be present..... **Inter-Mountain Basins Mixed Salt Desert Scrub (17)**

16a. *Atriplex polycarpa* dominates the shrub layer..... ***Atriplex polycarpa* Shrubland Alliance**[d]

16b. *Atriplex polycarpa* does NOT dominate the shrub layer..... **17**

17a. *Atriplex obovata* dominates the shrub layer ..... ***Atriplex obovata* Shrubland Alliance**[d]

17b. *Atriplex obovata* does NOT dominate the shrub layer **18**

18a. *Atriplex confertifolia* dominates the shrub layer ..... ***Atriplex confertifolia* Shrubland Alliance**[d]

18b. *Atriplex canescens* dominates the shrub layer..... ***Atriplex canescens* Shrubland Alliance**[d]

KEY A.2: Upland Woodland or Shrubland Systems and Alliances
(Woody cover > 10% cover present

1a. Upland forests and woodlands **2**
1b. Upland savannas, dwarf-shrublands, shrublands and steppe..... **22**

2a. Broadleaf forests and woodlands or matrix/large patch mixed conifer-aspen forests and woodlands **3**
2b. Conifer forests and woodlands (small patch inclusions of mixed conifer-broadleaf forests and woodlands may be present) **7**

3a. Upland mixed conifer-broadleaf forests and woodlands co-dominated by *Populus tremuloides* and a conifer trees (broadleaf and conifer trees, each with cover over 25% of total tree canopy cover) ..... **Inter-Mountain Basins Aspen - Mixed Conifer Forest and Woodland**
3b. Upland broadleaf forest or woodlands typically with less than 25% total tree canopy cover of conifers..... **4**

4a. Broadleaf forest or woodland typically dominated by *Populus tremuloides* with possible inclusions of other broadleaf tree species and less than 25% relative tree cover of conifers. Common in the Southern Rocky Mountains and may occur on the Colorado Plateau or upper elevation Sky Island mountains. ..... **Rocky Mountain Aspen Forest and Woodland (5)**
4b. Broadleaf forests and woodlands co-dominated by *Acer grandidentatum* or Madrean oaks with less than 25% relative tree canopy of each canopy type. **6**

5a. Broadleaf forest (tree cover > 60%) dominated by *Populus tremuloides*..... ***Populus tremuloides* Forest Alliance**[d]
5b. Broadleaf woodland dominated by *Populus tremuloides*..... ***Populus tremuloides* Woodland Alliance**[d]

6a. Broadleaf forest or woodand dominated by *Acer grandidentatum*, often found in mesic ravines and adjacent northly slopes ..... **Rocky Mountain Bigtooth Maple Ravine Woodland**
6b. Broadleaf woodlands dominated by Madrean oaks such as *Quercus arizonica, Q. emoryii, Q. gravesii, Q. grisea, Q. hypoleucoides, Q. mohriana, Q. oblongifolia,* and *Q. rugosa.* ..... **Madrean Encinal**

7a. Subalpine forests and woodlands dominated or co-dominated by *Pinus aristata, P. flexilis, Picea engelmannii* and/or *Abies lasiocarpa* **8**
7b. Montane and foothill forests and woodlands not dominated or co-dominated by the above high-elevation species **11**

8a. Subalpine conifer forests and woodlands dominated or co-dominated by *Pinus aristata* and/or *P. flexilis* (known from the Southern Rocky Mountain and may be present in mountains in central New Mexico)..... **Rocky Mountain Subalpine Limber-Bristlecone Pine Woodland**
8b. Subalpine conifer forests and woodlands NOT dominated or co-dominated by *Pinus aristata* or *P. flexilis* **9**

9a. Large and small patch subalpine conifer forests and woodlands of mesic environments (north aspect toeslopes) that are dominated or co-dominated by *Abies lasiocarpa* and/or *Picea engelmannii* with mesic understory species such as *Actaea rubra, Amelanchier alnifolia, Erigeron eximius, Rubus parviflorus, or Trifolium dasyphyllum* ..... **Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland (10)**
9b. Widespread matrix subalpine conifer forests and woodlands of drier environments that are dominated or co-dominated by *Abies lasiocarpa* and/or *Picea engelmannii* ..... **Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland (10)**

10a. Conifer forests and woodlands dominated or codominated by *Abies lasiocarpa* and/or *Picea engelmannii* with less than 25% relative tree cover of *Populus tremuloides* ..... ***Abies lasiocarpa – Picea englemannii* Forest Alliance**[d]
10b. Conifer forests and woodlands dominated or codominated by *Picea engelmannii* generally without *Abies lasiocarpa* present ..... ***Picea englemannii* Forest Alliance**[d]

11a. Montane conifer forests and woodlands..... **12**
11b. Foothill conifer forests and woodlands **17**

12a. Matrix *Pinus ponderosa* dominated woodlands with inclusions of *Pseudotsuga menziesii* woodlands on cool aspects. *Pinus edulis, Juniperus* spp, or *Populus tremuloides* may be also be present. Madrean species such as *Cupressus arizonica, Pinus arizonica, Pinus cembriodes, Pinus discolor, Pinus engelmannii, Pinus leiophylla, Pinus strobiformis, Quercus arizonica, Quercus emoryi, Quercus grisea Quercus hypoleucoides* or *Quercus rugosa* are ABSENT. *Juniperus deppeana* is a wider spread species and may be found in southern stands. ..... **Southern Rocky Mountain Ponderosa Pine Woodland**

12b. Conifer forests and woodlands dominated by species other than *Pinus ponderosa*, though sometime co-dominated by *Pinus ponderosa* and/or *Populus tremuloides* **13**

13a. Conifer forests and woodlands typically with Madrean species in the tree canopy and/or other conifers with understory of Madrean oaks such as *Quercus hypoleucoides* and *Quercus rugosa*. Common Submogollon and Sky Island mountain vegetation **14**

13b. Widespread conifer forests and woodlands that range from Rocky Mountain Cordillera into central New Mexico and Arizona generally above the Mogollon Rim. Stands are dominated by *Pseudotsuga menziesii, Picea pungens,* or *Abies concolor* WITHOUT Madrean oaks such as *Quercus hypoleucoides* and *Quercus rugosa*.....**15**

14a. Conifer forests and woodlands composed of Madrean pines (*Pinus arizonica, Pinus engelmannii, Pinus leiophylla* or *Pinus strobiformis*) and evergreen oaks (*Quercus arizonica, Quercus emoryi,* or *Quercus grisea*) intermingled with patchy shrublands on most mid-elevation slopes (1500-2300 m elevation). Includes *Pinus ponderosa* stands with Madrean pines or oaks. Other tree species include *Cupressus arizonica, Juniperus deppeana, Pinus cembriodes, P. discolor,* and *Pseudotsuga menziesii*. Subcanopy and shrub layers may include typical encinal and chaparral species or have moderate cover of perennial graminoids.. .....**Madrean Lower Montane Pine-Oak Forest and Woodland**

14b. Conifer forests and woodlands dominated by *Pseudotsuga menziesii, Abies coahuilensis*, or *Abies concolor* and Madrean oaks such as *Quercus hypoleucoides* and *Quercus rugosa*. Found in the Sierra Occidental and Oriental in northern Mexico. In US it is restricted to Sky Island Mountains and possibly extends into extreme southern end of the Colorado plateau ..... **Madrean Upper Montane Conifer-Oak Forest and Woodland**

15a. Matrix montane conifer forests and woodlands of drier environments that are dominated or co-dominated by *Abies concolor* or *Pseudotsuga menziesii*, and sometimes co-dominated by *Pinus ponderosa* or *P. contorta* and/or *Populus tremuloides* ..... **Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland (16)**

15b. Large and small patch montane conifer forests and woodlands of relative mesic environments (north aspects, toeslopes). Dominated or co-dominated by *Abies concolor, Picea pungens* or *Pseudotsuga menziesii*. Mesic species such as *Osmorhiza* sp., *Luzula* sp., *Thalictrum* sp., *Angelica* sp., *Vaccinium membranaceum, V. myrtillus*, and *Cornus sericea* commonly present in the understory.....**Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland**

16a. Conifer forest and woodlands 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**

16b. Conifer forests and woodlands dominated or co-dominated by *Pseudotsuga menziesii* with *Abies concolor* absent.....***Pseudotsuga menziesii* Forest Alliance**[d]

17a. Foothill conifer woodlands dominated or co-dominated by *Pinus edulis, Pinus monophylla* and/or *Juniperus* spp. with *Pinus ponderosa* codominant (usually >10% cover)..... **Southern Rocky Mountain Ponderosa Pine Woodland**

17b. Foothill conifer woodlands dominated or co-dominated by *Pinus edulis* and/or *Juniperus* spp. If present *Pinus ponderosa* is restricted to mesic microsites.. .....**18**

18a. Woodlands of desert mountains, generally south of Socorro and of the Mogollon Rim. *Pinus cembroides, P. discolor, Juniperus coahuilensis* or other Madrean species are typically present and diagnostic. *Juniperus deppeana, Juniperus pinchotii, Juniperus monosperma,* and/or *Pinus edulis* may be present to dominant. Madrean oaks such as *Quercus arizonica, Quercus emoryi, Quercus grisea* or *Quercus mohriana* may be present to codominant. *Pinus ponderosa* is absent or sparse. Understory layers are variable and may be dominated by shrubs or graminoids, or be absent..... **Madrean Pinyon-Juniper Woodland**

18b. Foothill conifer woodlands and shrubland NOT dominated or co-dominated by Madrean tree species..... **19**

19a. Woodlands dominated by *Pinus edulis* and/or *Juniperus monosperma* commonly encountered on dry mountains and foothills in southern Colorado east of the Continental Divide, in mountains and plateaus of north-central New Mexico (generally east of a line from the Continental Divide in Colorado to Albuquerque and Socorro) and on limestone and sandstone breaks in the Great Plains).. ..... **Southern Rocky Mountain Pinyon-Juniper Woodland (20)**

19b. Woodlands dominated or codominated by *Pinus edulis* and *Juniperus osteosperma* woodlands common on Colorado Plateau (usually above 2000 m. elevation) and restricted to the northwestern edge of MZ 25, if found in these map zones. Stands are typically is 4-5 m tall, with *J. scopulorum* at higher elevations. In the southern Colorado Plateau transition zone with Rocky Mountain Pinyon -Juniper Woodland, *Juniperus monosperma* may codominate or dominated stands. ..... **Colorado Plateau Pinyon-Juniper Woodland (20)**

20a. Woodlands solely dominated by *Pinus edulis* or codominated with species of *Juniperus* ..... ***Pinus edulis – (Juniperus* spp.) Woodland Alliance**[d]

20b. Woodlands with low cover (<5%) of *Pinus edulis* or *Pinus edulis* absent. **21**

21a. Seral or lower elevation (drier) woodlands dominated by *Juniperus osteosperma*. *Pinus edulis* is absent or limited to a few scattered individuals (very low cover, <5%) ..... ***Juniperus osteosperma* Woodland Alliance**[d]

21b. Seral or lower elevation (drier) woodlands dominated by *Juniperus monosperma*. *Pinus edulis* is absent or limited to a few scattered individuals (very low cover, <5%) ..... ***Juniperus monosperma* Woodland Alliance**[d]

22a. Savannas with 10-25% cover of trees (generally >3 m tall with a single main stem) over perennial grassland (25% or more herbaceous cover)..... **23**

22b. Shrub steppe, shrublands and dwarf-shrublands **26**

23a. Open tree layer is typically dominated by *Pinus ponderosa,* but may have *Pinus edulis* or *Juniperus* spp. present to codominant (usually above 2000 m. elevation). Typically has a strong perennial grass layer (>20% cover)..... **Southern Rocky Mountain Ponderosa Pine Savanna**

23b. Open tree layer is NOT dominated or codominated by *Pinus ponderosa* **24**

24b. Open tree layer is dominated by *Juniperus coahuilensis, Juniperus pinchotii*, and/or *Juniperus deppeana* with a strong perennial grass layer (>20% cover) is diagnostic. *Juniperus monosperma* may be present to co-dominant. This Madrean system is common in desert mountains generally south of Socorro and south of the Mogollon Rim. May extend into the extreme southern part of the Colorado Plateau. ..... **Madrean Juniper Savanna**

24b. Open tree layer is NOT dominated by Madrean trees (*Juniperus coahuilensis, Juniperus pinchotii*, and/or *Juniperus deppeana).* **25**

25a. Open tree layer is typically dominated by *Juniperus osteosperma* with a strong perennial grass layer (>20% cover). In the southern Colorado Plateau transition zone with Rocky Mountain Juniper Savanna and Woodland, *Juniperus monosperma* may codominate or dominate stands. *Juniperus scopulorum* may codominate at higher elevations. ..... **Inter-Mountain Basins Juniper Savanna**

25b. Open tree layer is typically dominated by *Juniperus monosperma* with a strong perennial grass layer (>20% cover). Widespread pinyon-juniper woodlands common on dry foothills and plains in southern Colorado east of the Continental Divide, in north-central New Mexico (generally east of a line from the Continental Divide in Colorado to Albuquerque and Socorro) and extends out onto limestone breaks in the Great Plains). ..... **Southern Rocky Mountain Juniper Woodland and Savanna**

26a. Dwarf or low shrubland or dwarf-shrub steppe.....**27**
26b. Shrubland or shrub steppe or desert scrub.....**28**

27a. Low shrubland or shrub steppe of foothills and plains, dominated or co-dominated by *Artemisia nova, A. bigelovii,* and/or *A. tridentata* ssp. *wyomingensis* (minor), and common on shallow rocky soils. Occurs from the Colorado Plateau across northern New Mexico into southeastern Colorado. If found in these map zones, this system would be restricted to the northern portion of MZ 25..... **Colorado Plateau Mixed Low Sagebrush Shrubland (45)**
27b. Open to moderately dense low shrubland of saline basins, bottomland and plains, dominated or co-dominated by *Atriplex confertifolia.* Occurs across the Intermountain western U.S and extends into the middle Rio Grande Valley and southern Great Plains. If found in these map zones, this system would be restricted to the northern portion of MZ 25..... **Inter-Mountain Basins Mixed Salt Desert Scrub (58)**

28a. Desert scrub or chaparral.....**29**
28b. Other shrubland or shrub steppe.....**49**

29a. Desert scrub limited to the western edge of MZ 25 and characterized by a sparse to moderately dense layer (2 to 50% cover) of xeromorphic microphyllous and broad leaved shrubs. *Larrea tridentata* and *Ambrosia dumosa* are typical dominants, but many different shrubs, dwarf shrubs, and cacti may codominate or form typically sparse understories. This system is a widespread desert scrub of the Sonoran and Mojave desert occurring as the vegetation matrix in broad valleys, lower bajadas, plains and low hills in the Mojave and lower Sonoran deserts..... **Sonora-Mojave Creosotebush-White Bursage Desert Scrub**
29b. Not as above.....**30**

30a. Desert scrub typically occurring in flat to gently sloping desert basins and on alluvial plains, extending up into lower to mid positions of piedmont slopes (bajada). The vegetation is characterized by a moderate to sparse shrub layer (<10% cover on extremely xeric sites) that is typically strongly dominated by *Larrea tridentata* with *Flourensia cernua* often present to codominant. A few scattered shrubs or succulents may also be present, such as *Agave lechuguilla, Parthenium incanum, Jatropha dioica, Koeberlinia spinosa, Lycium* spp., and *Yucca* spp. Additionally; *Flourensia cernua* will often strongly dominate in silty basins that are included in this ecological system. In general, shrub diversity is low as this ecological system lacks codominant thornscrub and other mixed desert scrub species that are common on the gravelly mid to upper piedmont slopes. However, shrub diversity and cover may increase locally where soils are deeper and along minor drainages with occasional *Atriplex canescens, Gutierrezia sarothrae,* or *Prosopis glandulosa*. Herbaceous cover is usually low and composed of grasses. This ecological system is the common lower elevation desert scrub that occurs throughout much of the Chihuahuan Desert and has recently expanded into former desert grasslands in the northern portion of its range ..... **Chihuahuan Creosotebush Desert Scrub**
30b. Not as above.....**31**

31a. Desert scrub occurring on gravelly mid to upper bajadas, foothills and dissected gravelly alluvial fans in the Chihuahuan Desert, on mid to upper piedmonts above the desert plains Chihuahuan Creosotebush Desert Scrub and extending up to the chaparral zone. Vegetation is characterized by the presence of *Larrea tridentata,* typically mixed with thornscrub or other desert scrub such as *Agave lechuguilla, Aloysia wrightii, Baccharis pteronioides, Dasylirion leiophyllum, Flourensia cernua* (not bottomland), *Fouquieria splendens, Koeberlinia spinosa, Krameria erecta, Leucophyllum minus, Mimosa aculeaticarpa var. biuncifera, Mortonia scabrella, Opuntia engelmannii, Parthenium incanum,* and *Rhus microphylla* (in drainages). Stands of *Acacia constricta, A. neovernicosa* or *A. greggii* dominated thornscrub are included in this system. If present, *Prosopis glandulosa* has relatively low cover and does not dominate the shrub layer. Grasses are common but generally have lower cover than shrubs. Common species may include *Bouteloua curtipendula, B. eriopoda, B. gracilis, B. hirsuta, B. ramosa, Dasyochloa pulchella,* and *Muhlenbergia porteri*. This system also includes upper piedmont stands of desert scrub that are strongly dominated by *Larrea tridentata* (not mixed). These creosotebush shrublands often have a sparse understory occurring on gravelly piedmont slopes that may extend down to (gravelly) upper basins. This ecological system is a widespread desert scrub of the Chihuahuan Desert and has recently expanded into former desert grassland and steppe in the northern portion of its range. ..... **Chihuahuan Mixed Desert and Thorn Scrub**
31b. Not as above.....**32**

32a. Widespread xeromorphic wooded desert scrub found on in the Arizona Upland portion of the Sonoran Desert, but may occur within transition zone in the western portion of the northern Chihuahuan Desert (western edge of MZ 25). Vegetation is typically *Larrea tridentata – Prosopis* species mixed desert scrub with emergent *Carnegia gigantea* and/or *Parkinsonia microphylla* as diagnostic species. There is typically high diversity of cacti in this type. ..... **Sonoran Paloverde-Mixed Cacti Desert Scrub (33)**

32b. Highly variable vegetation that occurs in transition zone between higher elevation desert scrub and foothill shrubland and woodlands. **34**

33b. Xeromorphic wooded mixed shrublands with abundant *Parkinsonia microphylla* and WITHOUT *Carnegia gigantea* present .....***Parkinsonia microphylla*** **Shrubland Alliance**[d]

33a. Xeromorphic wooded mixed shrublands with abundant *Carnegia gigantea* present..... .....***Carnegia gigantea*** **Wooded Shrubland Alliance**[d]

34a. Upland shrubland may occur in in transitional zone along the northwestern boundary of the Chihuahuan Desert (northwestern edge of MZ 25). It occurs in a often broad transition zone below Mogollon Chaparral and above the Sonoran Paloverde-Mixed Cacti Desert Scrub (700-1500 m elevation) and lacks characteristic xeromorphic wooded layer of saguaro and paloverde (too cold). *Larrea tridentata* is often present to codominant with scattered chaparral species, which are less sensitive to periods of freezing temperatures. Common associates include *Ericameria linearifolia*, or *Eriogonum fasciculatum* with taller shrub such as *Fouquieria splendens, Canotia holacantha* or *Simmondsia chinensis* and occasionally *Prosopis* spp .....**Sonoran Mid-Elevation Desert Scrub**

31b. Not as above.....**32**

32a. Desert scrub restricted to gypsum outcrops or sandy gypsiferous and/or often alkaline soils that occur in basins and slopes in the Chihuahuan Desert. Elevation range is from 1100-2000 m. These typically sparse grasslands, steppes or dwarf-shrublands dominated by a variety of gypsophilous plants, many of which are endemic to these habitats. Characteristic species include *Tiquilia hispidissima, Atriplex canescens, Calylophus hartwegii, Ephedra torreyana, Frankenia jamesii, Bouteloua breviseta, Mentzelia perennis, Nama carnosum, Calylophus hartwegii (= Oenothera hartwegii), Selinocarpus lanceolatus, Sporobolus nealleyi, Sporobolus airoides*, and *Sartwellia flaveriae*. This system does not include the sparsely vegetated gypsum dunes that are included in North American Warm Desert Active and Stabilized Dunes. ....**Chihuahuan Gypsophilous Grassland and Steppe**

32b. Desert scrub is not restricted to gypsum outcrops or sandy gypsiferous soils. **33**

33a. Desert steppe that typically includes an open mixed shrub-succulent or xeromorphic tree layer and is found on gently sloping bajadas, mesas and steeper piedmont and foothill slopes. It is characterized by lush (>20% cover) and typically diverse desert grasses, but may have a significant woody component of shrubs, trees and cacti (10-25% cover). Common grass species include *Bouteloua eriopoda, B. hirsuta, B. rothrockii, B. curtipendula, B. gracilis, Eragrostis intermedia, Muhlenbergia porteri, Muhlenbergia setifolia, Pleuraphis jamesii, Pleuraphis mutica*, and *Sporobolus airoides*, succulent species of *Agave, Dasylirion*, and *Yucca*, and tall shrub/short tree species of *Prosopis* and various evergreen oaks (e.g., *Quercus grisea, Quercus emoryi, Quercus arizonica*). This broadly defined system is common in the Borderlands of Arizona, New Mexico and northern Mexico [Apacherian region], but extends out into the Chihuahuan and Sonoran deserts, and north into Mogollon Rim Area of central Arizona. .... **Apacherian-Chihuahuan Semi-Desert Grassland and Steppe**

33b. Not as above.....**34**

34b. Desert scrub dominated or codominated by *Prosopis* spp **35**

34b. Shrubland NOT dominated or codominated by *Prosopis* spp.....**40**

35a. Shrublands dominated by *Prosopis glandulosa* with shortgrass species in the understory. *Ziziphus obtusifolia* and *Atriplex canescens* can codominate in some examples, as can *Opuntia* species in heavily grazed areas. Shortgrass species *Bouteloua gracilis* or *Buchloe dactyloides* are typically present. Other grasses may include *Aristida purpurea, Bouteloua curtipendula, Bouteloua eriopoda, Bouteloua hirsuta, Muhlenbergia torreyi, Pleuraphis jamesii, Sporobolus airoides*, and *Sporobolus cryptandrus*. This Shrubland is found in the southern portion of the western Great Plains in eastern New Mexico, Oklahoma and Texas. Historically this system probably occurred as a natural component on more fertile soils and along drainages, but it has expanded its range into prairie uplands in recent decades. If found in these map zones, this system would be restricted to the northeastern boundary of MZ 26. ..... **Western Great Plains Mesquite Woodland and Shrubland**

35b. Not as above **36**

36a. This ecological system occurs throughout much of the lower Rio Grande Plains and plateaus of northeastern Mexico and south Texas. Historically, this thornscrub was limited to rocky, broken uplands and drainages, but has become widespread in the last 100-150 years as the result of disturbance to adjacent savanna grasslands. The vegetation is characterized by an open to dense tall-shrub layer dominated or codominated by *Prosopis glandulosa* with many other species present to codominant, such as *Acacia berlandieri, Acacia farnesiana, Celtis pallida, Leucophyllum frutescens, Opuntia* spp., *Parkinsonia texana,* and *Yucca* spp. The herbaceous layer is generally sparse, but dense graminoids may dominate the herbaceous layer of stands with open shrub canopies or remnant patches of savanna. If found in these map zones, this system would be restricted to the southeastern portion of MZ 26 ..... **Tamaulipan Mesquite Upland Scrub** [e]

36b. Not as above **37**

37a. Desert scrub of vegetated coppice dunes and sandsheets found in the Chihuahuan Desert. Typically dominated by *Prosopis glandulosa* but includes *Atriplex canescens, Ephedra torreyana, E. trifurca, Poliomintha incana,* and *Rhus microphylla* coppice sand scrub with 10-30% total vegetation cover. *Yucca elata, Gutierrezia sarothrae,* and *Sporobolus flexuosus* are commonly present. Active eolian processes are diaganostic of this ecological system ..... **Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub (38)**

37b. Upland shrublands dominated by species of *Prosopis* that occur extensively in the foothills and piedmont in the Chihuahuan Desert extending into the Sky Islands and Mogollon Rim regions, and found in transitional areas into the southern Great Plains and in the northern Sonoran Desert. Stands occur above desert scrub (700-1500 m elevation). Vegetation is typically dominated by *Prosopis glandulosa* or *Prosopis velutina* and succulents. Other shrubs present may include thornscrub (*Acacia neovernicosa, Acacia constricta*) and species *Juniperus monosperma,* or *Juniperus coahuilensis*. Perennial grass cover is low (<10%) and *Larrea tridentata* and other desert scrub is absent or occasional (low cover) and never co-dominant. During the last century, the area occupied by this system has increased through conversion of desert grasslands. (See Chihuahuan - Apacherian foothills and Piedmont Semi-Desert Grassland and Steppe in herbaceous key if stands have significant perennial graminoid cover, or Chihuahuan Mixed Desert and Thorn Scrub if creosotebush codominant)..... **Apacherian-Chihuahuan Mesquite Upland Scrub (39)**

38a. Shrubland is dominated by *Prosopis glandulosa* ..... ***Prosopis glandulosa*** **Shrubland Alliance** [d]

38b. Shrubland is dominated by *Prosopis velutina* ..... ***Prosopis velutina*** **Shrubland Alliance** [d]

39a. Shrubland is dominated or co-dominated by one or more species of *Atriplex* **40**

39b. Upland vegetation NOT dominated by species of *Atriplex* **45**

40a. Widespread desert scrub typical of saline basins of the Sonoran and Mojave deserts that is limited to western edge of MZ 25. Vegetation is typically composed of one or more *Atriplex* species such as *Atriplex canescens, Atriplex obovata,* or *Atriplex polycarpa,* and lacking characteristic Chihuahuan Desert species such as *Flourensia cernua*. Graminoid species may include *Sporobolus airoides, Pleuraphis mutica,* or *Distichlis spicata* at varying densities ..... **Sonoran-Mojave Mixed Salt Desert Scrub** [e]

40b. Desert scrub of areas other than the western edge of MZ 25. ..... **41**

41a. Open to moderately dense shrublands of saline basins, alluvial slopes and plains in the northern portion of MZ 25 in the middle Rio Grande Valley and southern Great Plains. It is the typical saltbush dominated shrubland of these situations across the Intermountain western U.S Vegetation is typically composed of one or more *Atriplex* species such as *Atriplex canescens, A. confertifolia* or *A. obovata*, Characteristic desert species such as *Larrea tridentata,* and *Flourensia cernua* should not be present. ....**Inter-Mountain Basins Mixed Salt Desert Scrub (43)**

41b. Desert scrub typical of saline basins in the Chihuahuan Desert (the remainder of MZ 25 and 26). Vegetation is typically composed of one or more *Atriplex* species such as *Atriplex canescens, A. obovata,* or *A. polycarpa* along with species of *Allenrolfea, Flourensia, Salicornia, Suaeda,* or other halophytic plants. Graminoid species may include *Sporobolus airoides, Pleuraphis mutica*, or *Distichlis spicata* at varying densities. ..... **Chihuahuan Mixed Salt Desert Scrub (42)**

42a. *Atriplex polycarpa* dominates the shrub layer ..... ***Atriplex polycarpa* Shrubland Alliance**[d]

42b. *Atriplex polycarpa* does NOT dominate the shrub layer **43**

43a. *Atriplex obovata* dominates the shrub layer ..... ***Atriplex obovata* Shrubland Alliance**[d]

43b. *Atriplex obovata* does NOT dominate the shrub layer **44**

44a. *Atriplex confertifolia* dominates the shrub layer ..... ***Atriplex confertifolia* Shrubland Alliance**[d]

44b. *Atriplex canescens* dominates the shrub layer ..... ***Atriplex canescens* Shrubland Alliance**[d]

45a. Desert scrub on hot, dry rocky colluvial slopes, upper bajadas, sideslopes, ridges, canyons, hills and mesas escarpments that is dominated by relatively high cover of succulent species such as *Agave lechuguilla, Euphorbia antisyphilitica, Ferocactus spp., Fouquieria splendens, Opuntia engelmannii, Opuntia imbricata, Opuntia spinosior,* or *Yucca baccata* with low cover of desertscrub and grasses ..... **Chihuahuan Succulent Desert Scrub**

45b. Desert scrub is Not dominated by succulents species on rocky substrates. **46**

46a. Xeric thornscrub restricted to limestone and calcareous sandstone hills and caliche substrates in southern Texas and northeastern Mexico, and restricted to the southeastern portion of MZ 26. Soils are shallow, alkaline, strongly calcareous and underlain by bedrock or a caliche layer. Shrub cover is generally greater than 70% and often greater than 85%, and is typically less than 2 m in height. Dominant species include *Leucophyllum frutescens, Acacia berlandieri,* and *Acacia farnesiana* with many other shrub species that may be locally dominant such as *Acacia rigidula, Castela erecta* ssp. *texana, Celtis pallida, Eysenhardtia texana, Koeberlinia spinosa, Parkinsonia texana* var. *macra, Sophora secundiflora,* or *Yucca* spp. The sparse to moderately dense herbaceous layer is dominated by perennial graminoids. ....**Tamaulipan Calcareous Thornscrub**

46b. Not as above **47**

47a. Upland chaparral that is restricted to mountains in southeastern New Mexico (restricted to Guadalupe Mtns.), Trans-Pecos Texas (Davis and Chisos Mtns.) and Sierra Oriental in Mexico. It occurs on foothills, mountain slopes and canyons in drier habitats below the encinal and pine woodlands (1700-2500 m) along the mid-elevation transition from the Chihuahuan Desert. The moderate to dense shrub canopy includes many shrub oak species such as *Quercus intricata, Q. laceyi, Q. grisea, Q. emoryi, Q. toumeyi, Q. turbinella;* several widespread chaparral species such as *Arctostaphylos pungens, Ceanothus greggii, Fallugia paradoxa, Garrya wrightii;* and species characteristic of this system such as *Arbutus arizonica, A. xalapensis (= A. texana), Fraxinus greggii, Fendlera rigida (= Fendlera linearis), Garrya ovata, Purshia mexicana (= ssp. mexicana), Rhus virens var. choriophylla (= Rhus choriophylla), Salvia lycioides (= Salvia ramosissima)* and *Salvia regla*. ..... **Madrean Oriental Chaparral**

47b. Upland chaparral at other locations, occurring in foothills, mountain slopes and canyons in drier habitats below the encinal (evergreen oak) and Pinyon-Juniper woodlands (1000-2200 m elevation) from south-central New Mexico, southern and central Arizona, southeast Nevada, and southwest Utah. Vegetation is composed of moderate evergreen broadleaved shrubs. The moderate to dense shrub canopy is dominated by evergreen broadleaved shrubs such as *Quercus turbinella, Q. toumeyi, Cercocarpus montanus, Canotia holacantha, Ceanothus greggii, Forestiera pubescens (= Forestiera neomexicana), Garrya wrightii, Juniperus deppeana, Purshia stansburiana, Rhus ovata, Rhus trilobata,* and *Arctostaphylos pungens* and *Arctostaphylos pringlei* at higher elevations. This system is not found in MZ 26 ..... **Mogollon Chaparral (48)**

48a. Upland chaparral vegetation dominated by shrubs *Quercus turbinella*..... ***Quercus turbinella* Shrubland Alliance**
48b. Upland chaparral vegetation dominated by shrubs *Arctostaphylos pungens* ..... ***Arctostaphylos pungens* Shrubland Alliance**[d]

49a. Short to tall shrublands, typical of the Edwards Plateau, that extend west onto the Stockton Plateau in the eastern part of MZ 26 in Texas. Sites are characterized by relatively thin soils on massive limestone plateaus. Shrub cover is variable depending on amount of bedrock exposed. Characteristic species are *Quercus sinuata* var. *breviloba, Q. vaseyana,* or *Q. fusiformis*. *Juniperus ashei* may be abundant, but not dominant. Other characteristic species may include *Rhus virens, Rhus lanceolata, Cercis canadensis* var. *texensis, Forestiera pubescens, Forestiera reticulata, Fraxinus texensis, Ungnadia speciosa, Sophora secundiflora, Diospyros texana*, and *Mahonia trifoliolata*. ..... **Edwards Plateau Limestone Shrubland**
49b. Shrublands or shrub steppe located away from the massive limestones of the Edwards Plateau and lacking the above species. **50**

50a. Shrubland or shrub steppe of montane elevations, usually dominated or co-dominated by *Quercus gambelii*. *Quercus gambelii* may be locally absent but then the stand is mesic and dominated by *Amelanchier* spp. Other shrubs include *Acer grandidentatum, Cercocarpus montanus,* or *Symphoricarpos* spp., which may co-dominate some stands. *Artemisia tridentata* may be present to codominant (with *Quercus gambelii*). This system occurs in the northern portions of MZ 25, extending south into the Sacramento Mountains ..... **Rocky Mountain Gambel Oak - Mixed Montane Shrubland (51)**
50b. Shrubland or shrub steppe of lower montane and foothill elevations (drier) NOT co-dominated by *Quercus gambelii* **53**

51a. *Quercus gambelii* dominates or co-dominate the shrub layer. ..... ***Quercus gambelii* Shrubland Alliance**
51b. *Amelanchier* species dominates or co-dominate the shrub layer **52**

52a. *Amelanchier alnifolia* dominates or co-dominate the shrub layer. It is usually found at higher elevations and relatively mesic sites ..... ***Amelanchier alnifolia* Shrubland Alliance**[d]
52b. *Amelanchier utahensis* dominates or co-dominate the shrub layer. It is usually found at lower elevations and relatively dry sites ..... ***Amelanchier utahensis* Shrubland Alliance**[d]

53a. Shrubland or shrub steppe of lower montane (drier sites), foothills, plains (breaks), and canyons in central and eastern New Mexico along the Front Range of the Rocky Mountains (northern portion of MZ 25). *Quercus gambelii* is absent or with low cover (<5%), if present. Shrub layer is dominated or co-dominated by *Amelanchier utahensis, Cercocarpus montanus, Purshia tridentata, Rhus trilobata, Ribes cereum, Symphoricarpos oreophilus,* and/or *Yucca glauca. Artemisia tridentata* may be present, but not codominant.. ..... **Rocky Mountain Lower Montane-Foothill Shrubland (54)**
53b. Other shrubland or shrub steppe **55**

54a. *Cercocarpus montanus* dominates the shrub layer. ..... ***Cercocarpus montanus* Shrubland Alliance**[d]
54b. *Purshia tridentata* dominates the shrub layer. ..... ***Purshia tridentata* Shrubland Alliance**[d]

55a. Montane or subalpine (>2000 m elevations) shrubland or shrub steppe dominated or co-dominated by *Artemisia tridentata* ssp. *vaseyana, A. tridentata* ssp. *spiciformis*, non-riparian *A. cana ssp. viscidula* and/or *A. arbuscula* ssp. *arbuscula. Symphoricarpos* spp. may co-dominate some stands. If found in these map zones, this system would be restricted to the northern portion of MZ 25..... **Inter-Mountain Basins Montane Sagebrush Steppe[e] (56)**

55b. Upland shrublands of foothill, plains or basins..... **57**

56a. *Artemisia tridentata* ssp. *vaseyana* dominates shrub layer, shrub cover greater than or equal to 10%, and perennial herbaceous cover with less than 25% ..... ***Artemisia tridentata* ssp. *vaseyana* Shrubland Alliance[d, e]**

56b. *Artemisia tridentata* ssp. *vaseyana* dominates shrub layer, shrub cover between 10 and 40%, and perennial herbaceous cover at least 25% ..... ***Artemisia tridentata* ssp. *vaseyana* Shrub Herbaceous Alliance[d, e]**

57a. Shrublands dominated by *Prosopis glandulosa* with shortgrass species in the understory. *Ziziphus obtusifolia* and *Atriplex canescens* can codominate in some examples, as can *Opuntia* species in heavily grazed areas. Shortgrass species *Bouteloua gracilis* or *Buchloe dactyloides* are typically present. Other grasses may include *Aristida purpurea, Bouteloua curtipendula, Bouteloua eriopoda, Bouteloua hirsuta, Muhlenbergia torreyi, Pleuraphis jamesii, Sporobolus airoides*, and *Sporobolus cryptandrus*. This Shrubland is found in the southern portion of the western Great Plains in eastern New Mexico, Oklahoma and Texas. Historically this system probably occurred as a natural component on more fertile soils and along drainages, but it has expanded its range into prairie uplands in recent decades. If found in these map zones, this system would be restricted to the northeastern boundary of MZ 26. ..... **Western Great Plains Mesquite Woodland and Shrubland**

57b. Not as above..... **58**

58a. Shrubland occupying prairie dunes, blowouts, and sand plains in the western Great Plains. Shrub cover is sparse to moderately dense dominated by *Artemisia filifolia* or *Quercus havardii*, with a sparse to moderately dense graminoid layer of *Andropogon hallii, Schizachyrium scoparium, Sporobolus cryptandrus, Calamovilfa gigantea, Hesperostipa comata*, or *Bouteloua* spp. Other shrub species that may also be present include *Yucca glauca, Prosopis glandulosa, Rhus trilobata*, and *Prunus angustifolia*. ..... **Western Great Plains Sandhill Steppe (59)**

58b. Shrubland NOT dominated by *Artemisia filifolia* or *Quercus havardii*..... **60**

59a. *Artemisia filifolia* dominates the shrub layer..... ***Artemisia filifolia* Shrubland Alliance[d]**

59b. *Quercus havardii* dominates the shrub layer..... ***Quercus havardii* Shrubland Alliance[d]**

60a. Shrubland or shrub steppe dominated or co-dominated by *Artemisia tridentata* ssp. *tridentata* and/or *Artemisia tridentata* ssp. *wyomingensis. Symphoricarpos* spp. or *Purshia tridentata* may co-dominate some stands..... **61**

60b. Shrubland or shrub steppe NOT dominated by *Artemisia* spp. **63**

61a. Low shrubland or shrub steppe dominated or co-dominated by *Artemisia bigelovii* or *A. nova.*, possibly with *A. tridentata ssp. wyominensis* present. Found on shallow, rocky soils ..... **Colorado Plateau Mixed Low Sagebrush Shrubland**

61b. *Artemisia tridentata* dominates shrub layer, shrub cover greater than or equal to 10%, and perennial herbaceous cover less than 25%. If found in these map zones, this system would be restricted to the northern portion of MZ 25..... **Inter-Mountain Basins Big Sagebrush Shrubland[e] (62)**

62a. *Artemisia tridentata* ssp. *tridentata* dominates the shrub layer..... ***Artemisia tridentata* ssp. *tridentata* Shrubland Alliance[d, e]**

62b. *Artemisia tridentata* ssp. *wyomingensis* dominates the shrub layer..... ***Artemisia tridentata* ssp. *wyomingensis* Shrubland Alliance[d, e]**

63a. *Krascheninnikovia lanata* dominate the shrub layer. Typically found in basins. Stands are restricted to the northern portions of of MZ 25, if found in these map zones. ..... **Inter-Mountain Basins Mixed Salt Desert Scrub (65)**

63b. *Ericameria nauseosa* and/or *Gutierrezia sarothrae* dominate an open shrub layer with or without grass understory **64**

64a. Heavily disturbed sites of the western Great Plains, with an open to dense shrub layer and limited graminoid herbaceous cover. Shrub species may include *Ericameria nauseosa* and/or *Gutierrezia sarothrae*. Without disturbance, these sites would be characterized as shortgrass prairie, dominated by moderately dense to dense perennial shortgrasses with low cover of shrubs and dwarf shrubs. However, heavy disturbance has lead to loss of the grass component, leaving an open to dense shrub layer that resembles a shrubland. ..... **Western Great Plains Shortgrass Prairie (66)**

64b. Widespread large patch shrub steppe found on dry foothills, and plains, and mesas in the intermountain western US. It occurs across northwestern and central New Mexico from the Colorado Plateau region, grading into Western Great Plains Shortgrass Prairie system occurrences to the east. The shrub layer may be open to dense, with a sparse to moderately dense perennial graminoid layer. Occurrences may be difficult to distinguish from *Ericameria nauseosa* and/or *Gutierrezia sarothrae* dominated stands of Western Great Plains Shortgrass Prairie system ..... **Inter-Mountain Basins Semi-Desert Shrub Steppe (66)**

65a. *Krascheninnikovia lanata* dominates the shrub layer..... ***Krascheninnikovia lanata* Shrubland Alliance**[d]

65b. *Krascheninnikovia lanata* does not dominate the shrub layer..... **66**

66a. *Gutierrezia sarothrae* dominates the shrub layer ..... ***Gutierrezia sarothrae* Shrubland Alliance**[d]

66b. *Ericameria nauseosa* dominates the shrub layer..... **67**

67a. *Ericameria nauseosa* dominates the shrub layer. Perennial herbaceous cover is less than 25%..... ***Ericameria nauseosus* Shrubland Alliance**[d]

67b. *Ericameria nauseosa* dominates the shrub layer. Perennial herbaceous cover is greater than 25% ..... ***Ericameria nauseosus* Shrub Herbaceous Alliance**[d]

KEY B: Herbaceous Ecological Systems and Alliances
(Herbaceous vegetation dominant > 20% cover with low (<10%) woody cover)

1a. Wetlands of drainages, springs or seeps **B.1**
1b. Upland grasslands **B.2**

KEY B.1: Herbaceous Wetland Ecological Systems and Alliances
(Herbaceous vegetation dominant > 20% cover with low (<10%) woody cover)

1a. High elevation herbaceous wetlands (subalpine-montane) **2**
1b. Middle and lower elevation herbaceous wetlands (lower montane to valley floor) **3**

2a. Subalpine to montane wet meadows without a 40 cm deep organic layer ..... **Rocky Mountain Alpine - Montane Wet Meadow**[c]
2b. Subalpine wetlands with a 40 cm deep organic layer ..... **Rocky Mountain Subalpine - Montane Fen**[c]

3a. Wetland common in western Great Plains. If found here, this system would be restricted to the transition zone with the Great Plains in eastern portions of MZ 25 and northern portions of MZ 26. ..... **11**
3b. Wetland found in desert portions of MZ 25and MZ 26. ..... **4**

4a. Grasslands of basins and swales that may occasionally flood (but can lack wetland soil characteristics) and are typically dominated by *Pleuraphis mutica* (tobosa swales) on clayey sites with other mesic graminoids such as *Pascopyrum smithii* or *Panicum obtusum* present but not dominant. *Sporobolus airoides* is typical of more alkaline and somewhat saline sites, and *Sporobolus wrightii* (less alkaline sites). In MZ 26, Landfire is mapping non-tobosa bottomland and swale wetlands separately so it is important to record dominant species.. ..... **Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (5)**
4.b. Grasslands of other wetland situations. **7**

5a. Vegetation dominated by *Pleuraphis mutica* ..... ***Pleuraphis mutica* Herbaceous Vegetation Alliance**[d]
5b. Vegetation dominated by *Sporobolus spp.* 6

6a. Vegetation dominated by *Sporobolus wrightii* ..... ***Sporobolus wrightii* Herbaceous Vegetation Alliance**[d]
6b. Vegetation dominated by *Sporobolus airoides* ..... ***Sporobolus airoides* Herbaceous Vegetation Alliance**[d]

7a. Wetland is intermittently flooded vegetated playa. After rain events vegetation cover may exceed sparse cover (>total 10%) and is often dominated by *Distichlis spicata* ..... (**North American Warm Desert Playa**[a]) ..... **North American Warm Desert Sparsely Vegetated Systems**[b]
7b. Grasslands of other wetland situations. **8**

8b. Land cover is restricted to intermittently flooded drainages. Vegetation often includes denser clumps of discontinuous vegetation (shrubs, grasses and occasional trees), but overall washes are typically sparsely vegetated. Herbaceous vegetation such as perennial grasses, *Distichlis spicata* or *Sporobolus airoides* may dominate wash. Scattered shrub may be present such as *Acacia greggii, Brickellia laciniata, Baccharis sarothroides, Chilopsis linearis, Fallugia paradoxa, Hymenoclea salsola, Hymenoclea monogyra, Juglans microcarpa, Prosopis spp., Psorothamnus spinosus, Prunus fasciculata, Rhus microphylla, Salazaria mexicana* or *Sarcobatus vermiculatus* ..... (**North American Warm Desert Wash**[a]) ..... **North American Warm Desert Sparsely Vegetated Systems**[b]
8. Grasslands of other wetland situations. **9**

9a. Herbaceous wetland found in typically small interdunal swales with high water tables. Stands typically occur in wind deflation areas that are scoured down to the water table. Vegetation is characterized by common emergent herbaceous species of *Cyperus, Eleocharis, Juncus, Schoenoplectus* and grasses such as *Achnatherum hymenoides*, but may include endemic plants or animals. Occasionally scattered trees and shrubs, such as *Populus deltoids, P. fremontii*, *Baccharis salicifolia, Pluchea odorata Prosopis glandulosa*, or *Salix interior* may be present and rarely dominant ....**North American Warm Desert Interdunal Swale Wetland**[c]

9b. Wetland not found in active or stabilized desert dune systems.....**8**

10a. Low elevation desert wetlands typically fed by alkaline springs or seeps. The type of vegetation depends on depth of water. In shallow margins, emergent plants typical of riparian vegetation are present including species of *Carex, Juncus*, and *Schoenoplectus*. .....**North American Warm Desert Cienega**[c]

10b. Middle to lower elevation herbaceous wetlands found in (lower montane to valley floor). Vegetation is characterized by a variety of common emergent herbaceous species of *Eleocharis, Juncus, Schoenoplectus*, and *Typha*. .....**North American Arid West Emergent Marsh**[c]

11a. Herbaceous wetlands associated with saline playa lakes and intermittently flooded depressional basins (playas). Strongly saline soils 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. Species that typify this system are salt tolerant and halophytic species such as *Distichlis spicata, Sporobolus airoides,* and *Hordeum jubatum*. Other commonly occurring taxa include *Salicornia sp., Schoenoplectus maritimus, Schoenoplectus americanus, Suaeda calceoliformis, Spartina* spp., and shrubs such as *Krascheninnikovia lanata*of closed basins. Restricted to the eastern edge of MZ 25 and the northern edge of MZ 26 in transition zone with Great Plains.....**(Western Great Plains Saline Depression Wetland** [a,e]**)** .....**Western Great Plains Depressional Wetland Systems**[b, e]

11b. Not as above.....**12**

12a. Herbaceous wetlands associated with non-saline playa lakes and rainwater basins primarily in closed depressional basins. The her and deeper depression, while *Pascopyrum smithii, Buchloe dactyloides, Chenopodium leptophyllum,* and *Amaranthus retroflexus* are more common in shallow depressions in rangelandof closed basins. Restricted to the eastern edge of MZ 25 and the northern edge of MZ 26 in transition zone with Great Plains .... **(Western Great Plains Closed Depression Wetland**[a,e]**)** .....**Western Great Plains Depressional Wetland Systems**[b, e]

12b. Herbaceous wetland found in of lowland depressions and along lake shores in the western Great Plains. Except during exceptional drought years there is a permanent water source through most of the year. Vegetation is characterized by a variety of emergent herbaceous species of *Typha, Carex, Eleocharis, Juncus, Spartina*, and *Schoenoplectus*, as well as floating genera such as *Potamogeton, Sagittaria.* This system includes submergent and emergent marshes and associated wet meadows and wet prairies of closed basins. Restricted to the eastern edge of MZ 25 and the northern edge of MZ 26 in transition zone with Great Plains ..... **(Western Great Plains Open Freshwater Depression Wetland**[a,e]**)** .....**Western Great Plains Depressional Wetland Systems**[b, e]

KEY B.2: Herbaceous Upland Ecological Systems and Alliances
(Herbaceous vegetation dominant > 20% cover with low (<10%) woody cover)

1a. Alpine herbaceous vegetation.....**2**

1b. Subalpine, montane, foothill and basin vegetation.....**3**

2a. 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 *Artemisia arctica, Carex* spp., *Deschampsia cespitosa, Festuca brachyphylla, Geum rossii, Kobresia myosuroides*, and *Trifolium dasyphyllum*. Cover of cushion plants is generally low. If found in these map zones, this system would be restricted to the highest mountains of MZ 25.....**Rocky Mountain Alpine Turf**

2b. Alpine cover has significant amounts of vascular herbaceous vegetation (typically cushion plants) generally with greater than 50% cover exposed rock. It typically occurs on wind-exposed sites. If found in these map zones, this system would be restricted to the highest mountains of MZ 25..... **Rocky Mountain Alpine Fell-Field**

3a. Subalpine herbaceous vegetation found above 3000 m in elevation. Forbs typically contribute more to overall cover than graminoids. Important species include *Erigeron* spp., *Aster* spp., *Mertensia* spp., *Penstemon* spp., *Campanula* spp., *Lupinus* spp., *Solidago* spp., *Ligusticum* spp., *Balsamorhiza sagittata, Wyethia* spp., *Deschampsia caespitosa, Koeleria macrantha*, and *Dasiphora fruticosa, Rosa woodsii*, and *Symphoricarpos* spp. If found in these map zones, this system would be found in high mountain meadows of MZ 25.....**Rocky Mountain Subalpine Mesic Meadow**

3b. Montane, foothill, plains, basin and desert grasslands **4**

4a. Montane or subalpine grasslands found between 2200-3000 m elevation on dry flat to rolling plains or lower side slopes , but may extend up to 3350 m on warm aspects. Vegetation is dominated by bunch grasses such as *Danthonia* spp., *Festuca* spp., *Muhlenbergia filiculmis, M. montana* or *Pseudoroegneria spicata.* ..... **Southern Rocky Mountain Montane - Subalpine Grassland**

4b. Foothill, plains, basin and desert grasslands **5**

5a. Grasslands of Colorado Plateau, foothills and plains. **6**

5b. Desert grasslands and transition areas in the southern Great Plains.....**9**

6a. Grasslands of Rocky Mountain Front Range foothills and Great Plains **7**

6b. Dry grasslands occur in lowland or upland areas and may occupy swales, playas, mesatops, plateau parks, alluvial flats, and plains. Sites are typically xeric. These grasslands are typically dominated or codominated by *Achnatherum hymenoides, Aristida* spp., *Bouteloua gracilis, Hesperostipa comata, Muhlenbergia* spp., or *Pleuraphis jamesii* and may include scattered shrubs and dwarf-shrubs of species of *Artemisia, Atriplex, Coleogyne, Ephedra, Gutierrezia*, or *Krascheninnikovia lanata*. It occurs across northwestern and central New Mexico from the Colorado Plateau region to where it grades into Western Great Plains Shortgrass Prairie system. This system is widespread in the Intermountain western U. S. .... **Inter-Mountain Basins Semi-Desert Grassland**

7a. Mixed grass vegetation found along the foothills of the Rocky Mountains, but extending east out into the Great Plains in piedmont areas where higher elevation allow for more orographic precipitation (generally 40 cm or more annual precipitation). It is best characterized as a mixture of short and mid- and/or tall grasses on moderate to gentle slopes. Tall grasses are more common along the base of foothill slopes and on deep gravelly soils. Common species may include *Andropogon gerardii, Bouteloua gracilis, Muhlenbergia montana, Pascopyrum smithii, Schizachyrium scoparium, Sporobolus cryptandrus, Hesperostipa comata*, or *Hesperostipa neomexicana*..... ..... **Western Great Plains Foothill and Piedmont Grassland (8)**

7b. Plains grasslands occurring in the rain shadow east of the Rocky Mountains on flat to rolling uplands with loamy soils ranging from sandy to clayey. Annual precipitation is generally < 30 cm. In much of its range, this broadly defined matrix shortgrass grassland and steppe system is typically dominated by *Bouteloua* spp.. Other associated graminoids may include *Buchloe dactyloides, Hesperostipa comata, Koeleria macrantha (= Koeleria cristata), Pascopyrum smithii (=Agropyron smithii), Pleuraphis jamesii*, and *Sporobolus cryptandrus*. Although tallgrass and mid-grass species may be present especially on more mesic soils and sites, they are secondary in importance to the sod-forming short grasses. Shrub species such as *Artemisia bigelovii, A. filifolia, A. tridentata, Atriples canescens, Ericameria nauseosa, Gutierrezia sarothrae* or *Krascheninnikovia lanata* may be present, but shrub cover is typically low..... ..... **Western Great Plains Shortgrass Prairie (8)**

8a. Vegetation dominated by *Bouteloua gracilis* ..... ***Bouteloua gracilis* Herbaceous Vegetation Alliance[d]**

8b. Vegetation dominated by *Pleuraphis jamesii* ..... ***Pleuraphis jamesii* Herbaceous Vegetation Alliance[d]**

9a. Desert grasslands and steppe restricted to gypsum outcrops or sandy gypsiferous and/or alkaline soils that occur in basins and slopes in the Chihuahuan Desert. Elevation ranges from 1100 to 2000 m. These typically sparse grasslands, steppes or dwarf-shrublands are dominated by a variety of gypsophilous plants,

many of which are endemic to these habitats. Characteristic species include *Tiquilia hispidissima, Atriplex canescens, Calylophus hartwegii, Ephedra torreyana, Frankenia jamesii, Bouteloua breviseta, Mentzelia perennis, Nama carnosum, Calylophus hartwegii (= Oenothera hartwegii), Selinocarpus lanceolatus, Sporobolus nealleyi, Sporobolus airoides,* and *Sartwellia flaveriae*. This system does not include the sparsely vegetated gypsum dunes that are included in North American Warm Desert Active and Stabilized Dunes..... **Chihuahuan Gypsophilous Grassland and Steppe**

9b. Desert grasslands or steppe not restricted to gypsum outcrops or sandy gypsiferous soils..... **10**

10a. Chihuahuan desert grassland on loamy plains in the northern Chihuahuan and occurring on alluvial flats and loamy (sandy loam to clay loam) plains and may extend up from into the lower piedmont slopes. It is characterized by open to lush (>20% cover) of *Bouteloua eriopoda* and/or *Pleuraphis mutica.* Cover of shrubs and succulents is typically sparse, although scattered *Larrea tridentata*, *Fleurensia cernua* and *Prosopis glandulosa* is common on degraded.sites. If present, mesic graminoids such as P*ascopyrum smithii, Panicum obtusum, Sporobolus airoides, and Sporobolus wrightii* typically have low cover and are restricted to drainages and moist depressions (inclusions). Once widespread in southern New Mexico and extending north and east into the southern Great Plains and southeast into Trans-Pecos Texas. .... **Chihuahuan Loamy Plains Desert Grassland**

10b. Not as above..... **11**

11a. Dry grasslands found on sandy plains, and mesas and typicially dominated or codominated by *Achnatherum hymenoides Bouteloua eriopoda, B. hirsuta, Hesperostipa neomexicana, Pleuraphis. jamesii, Sporobolus crytandrus,* and *S. flexuosus* often with scatter shrubs and stem succulents such as *Ephedra torreyana,E. trifurca, Falugia paradoxa, Yucca elata,* and *Y. torreyana*..... ..... **Chihuahuan Sandy Plains Semi-desert Grassland**

11b. Not as above..... **12**

12a. Desert grassland on gently sloping bajadas, mesas and steeper upper piedmont and foothill slopes, that may include an open mixed shrub-succulent or xeromorphic tree layer. It is characterized by lush (>20% cover) and typically diverse desert grasses, but may have a significant woody component of shrubs, trees and cacti (10-25% cover). Common grass species include *Bouteloua eriopoda, B. hirsuta, B. ramosa, B. rothrockii, B. curtipendula, B. gracilis, Eragrostis intermedia, Muhlenbergia porteri, M. setifolia, Pleuraphis jamesii,* and *Sporobolus airoides*, succulent species of *Agave, Dasylirion,* and *Yucca,* and tall shrub/short tree species of *Prosopis* and various evergreen oaks (e.g., *Quercus grisea, Q. emoryi, Q. arizonica*). This broadly defined system is common in the Borderlands of Arizona, New Mexico, and northern Mexico (Apacherian region), but extends across the Chihuahuan and Sonoran Deserts, and north into the Mogollon Rim area of central Arizona (south of the Colorado Plateau) and in New Mexico to Socorro and Roswell..... **Apacherian-Chihuahuan Semi-Desert Grassland and Steppe**

12b. Grasslands of basins and swales that may occasionally flood, but can lack wetland soil characteristics. Vegetation is typically dominated by *Pleuraphis mutica* (tobosa swales) on clayey sites with other mesic graminoids such as *Pascopyrum smithii* or *Panicum obtusum* present, but not dominant. *Sporobolus airoides* and/or *Sporobolus wrightii* may dominate more alkaline or somewhat saline sites, with *Sporobolus wrightii* occupying less alkaline sites.. ..... **Chihuahuan-Sonoran Desert Bottomland and Swale Grassland (13)**

13a. Vegetation dominated by *Pleuraphis mutica* ..... ***Pleuraphis mutica*** **Herbaceous Vegetation Alliance**[d]

13b. Vegetation dominated by *Sporobolus* spp..... **14**

14a. Vegetation dominated by *Sporobolus wrightii*..... ***Sporobolus wrightii*** **Herbaceous Vegetation Alliance**[d]

14b. Vegetation dominated by *Sporobolus airoides* ..... ***Sporobolus airoides*** **Herbaceous Vegetation Alliance**[d]