DRAFT DESCRIPTIONS OF SYSTEMS, MAPPING SUBSYSTEMS, AND VEGETATION TYPES FOR PHASE V

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The following descriptions cover the systems that have been identified for the legend for Phase V of the Ecological Systems Classification and Mapping Project in support of the Texas Comprehensive Wildlife Conservation Strategy for the Texas Parks and Wildlife Department. Many of these descriptions were drafted from System descriptions available from NatureServe (http://www.natureserve.org/explorer/). Most System descriptions were modified, and all Vegetation Type descriptions were generated from discussions regarding these cover types. These brief narratives generally focus on 'typical' type concepts, and mapped vegetation types often circumscribe more variation on the ground than what is described here. For each system, a number of cover types, or "Vegetation Types" were described. A common name is given for each Vegetation Type, and this name is used in the table of contents and for the map legend. Additionally, a second name is provided which more directly ties the Vegetation Type to the system of which it is a part. A numeric identifier is also provided. This identifier represents the identifier used by NatureServe for the system. For the Vegetation Type, a digit suffix is provided to distinguish the various cover types within the system. In parentheses directly following the common name of the Vegetation Type, a number is provided. This number represents the numeric code used to track the Vegetation Types during the mapping process.

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Forests, Woodlands and Savannas

Madrean Pinyon - Juniper Woodland
Identifier: CES305.797

Geology: Mainly occupies Tertiary igneous substrates, including rhyolitic and tuff formations, as well as Permian and Cretaceous limestones. Other substrates such as sandstone and colluvium are also found associated with this system.

Landform: Rugged to gently rolling landscapes of hills and mountains at intermediate elevations.

Soils: The system typically occupies Igneous Hill & Mountain and Limestone Hill and Mountain ecoclasses, but may occur on various other ecoclasses, including Limestone Hill, Mountain Loam, Foothill Slope, Igneous Divide, Shallow, Sandstone Hill and Mountain, and others.

Description: This system occurs in the hills and mountains of the Trans-Pecos as well as in Mexico, New Mexico, and Arizona. Soils, often derived from igneous or limestone parent material (but other substrates are encountered) in Texas, are generally dry and rocky on rugged to gently rolling mountain slopes, foothills, and hills. This system can present as shrublands, open woodlands, or closed woodlands. Pinyon pines and junipers typically dominate, but oaks may co-dominate some occurrences and are often present. Pine species typical of the canopy include *Pinus cembroides* (Mexican pinyon pine), *Pinus edulis* (pinyon, primarily in the Guadalupe and Sierra Diablo Mountains), or *Pinus remota* (paper-shell pinyon). Junipers codominating with the pines include *Juniperus deppeana* (alligator juniper), *Juniperus pinchotii* (redberry juniper), *Juniperus monosperma* (one-seeded juniper), or *Juniperus coahuilensis (rose-fruited juniper).* Oaks, which may be present to codominant with pines and junipers, include *Quercus grisea* (gray oak), *Quercus mohriana* (Mohr's shin oak), *Quercus emoryi* (Emory oak), and/or *Quercus gravesii* (Chisos red oak). In woodlands, the understory may have a well-developed shrub layer, often of the species in the canopy but also sometimes including species such as *Cercocarpus montanus* (mountain mahogany), *Rhus trilobata* (skunkbush sumac), and *Mimosa aculeaticarpa* var. *biuncifera* (catclaw mimosa). The herbaceous layer of woodlands or shrublands are typically dominated by graminoids, and may include species such as *Bouteloua curtipendula* (sideoats grama), *Bouteloua gracilis* (blue grama), *Bouteloua hirsuta* (hairy grama), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Muhlenbergia pauciflora* (New Mexican muhly), *Muhlenbergia setifolia* (curlyleaf muhly), *Nassella tenuissima* (finestem needlegrass), *Piptochaetium fimbriatum* (pinyon ricegrass), and *Muhlenbergia emersleyi* (bull muhly). In Culberson County, the pine (*Pinus edulis*) and juniper (*Juniperus monosperma*) show the relationship of this system to other pinyon-juniper systems to the north, but other components of these occurrences recommend the relationship to the Madrean system.

VEGETATION TYPES:

Trans-Pecos: Pinyon - Juniper Woodland (11101)

Madrean Pinyon - Juniper Woodland
Identifier: CES305.797.1 **MoRAP Code:** 11101
Description: This woodland phase of the system may have an open to closed canopy at a height greater than 4 meters. Pinyon pines and junipers dominate the canopy, though oaks may be present.

Trans-Pecos: Pinyon - Juniper Shrubland (11105)

Madrean Pinyon - Juniper Shrubland
Identifier: CES305.797.2 **MoRAP Code:** 11105
Description: The shrubland phase of the system is similar or identical in composition, but is characterized by lower stature representatives of the pinyon pines and junipers which dominate the canopy. Canopy height is generally greater than 2 meters but less than 4 meters, and canopy cover can be open to closed.

Trans-Pecos: Pinyon – Juniper - Oak Woodland (11111)

Madrean Pinyon – Juniper - Oak Woodland
Identifier: CES305.797.3 **MoRAP Code:** 11111
Description: Woodlands that have oak species such as *Quercus grisea* (gray oak), *Quercus mohriana* (Mohr's shin oak), *Quercus emoryi* (Emory oak), and/or *Quercus gravesii* (Chisos red oak) co-dominant with pinyon pines and juniper in the canopy.

Madrean Lower Montane Pine - Oak Forest and Woodland
Identifier: CES305.796

Geology: Tertiary igneous substrates are commonly encountered with this system in the Davis Mountains region, but the system may also occur on sandstone and limestone substrates, such as in the Guadalupe Mountains region.
Landform: This system occupies the relatively rugged slopes of the mountainous areas of the Trans-Pecos, but may also occupy gently rolling landscapes at higher elevations.
Soils: Often rocky soils derived from igneous and sedimentary substrates, but also mountain loams.

Description: This system occurs at higher elevations of the Davis, Chisos, and Guadalupe Mountains than the Madrean Pinyon – Juniper Woodland. It is typically dominated by *Pinus ponderosa* (ponderosa pine) [or *Pinus arizonica* (Arizona pine) in the Chisos], but oak species such as *Quercus emoryi* (Emory oak), *Quercus grisea* (gray oak), *Quercus x pauciloba* (wavyleaf oak), and *Quercus gambelii* (Gambel oak) may be present to codominant. The subcanopy and shrub layer are typically not dense and may include species of the canopy as well as *Quercus hypoleucoides* (silverleaf oak), *Juniperus deppeana* (alligator juniper), *Cercocarpus montanus* (mountain mahogany), *Holodiscus dumosus* (rockspirea), *Symphoricarpos* spp. (snowberries), *Nolina* spp. (sacahuista), *Cylindropuntia imbricata* (tree cholla), and *Mimosa aculeaticarpa* var. *biuncifera* (catclaw mimosa). *Pinus cembroides* (Mexican pinyon pine), and in the Guadalupe Mountains, *Pinus edulis* (pinyon pine), becomes a common component, particularly at the lower elevational limits of this type and in more xeric situations. The

herbaceous layer is typically dominated by graminoids including *Piptochaetium fimbriatum* (pinyon ricegrass), *Muhlenbergia emersleyi* (bull muhly), *Muhlenbergia pauciflora* (New Mexican muhly), *Bouteloua curtipendula* (sideoats grama), *Bouteloua gracilis* (blue grama), *Bouteloua hirsuta* (hairy grama), *Bothriochloa barbinodis* (cane bluestem), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Andropogon gerardii* (big bluestem), *Blepharoneuron tricholepis* (pine dropseed), *Koeleria macrantha* (junegrass), *Hesperostipa neomexicana* (New Mexico feathergrass), *Heteropogon contortus* (tanglehead), *Muhlenbergia montana* (mountain muhly), *Muhlenbergia dubia* (pine muhly), *Muhlenbergia rigida* (purple muhly), *Eragrostis intermedia* (plains lovegrass), *Panicum bulbosum* (bulb panicum), *Schizachyrium cirratum* (Texas bluestem), and *Schizachyrium scoparium* (little bluestem).

VEGETATION TYPES:

Trans-Pecos: Ponderosa/Arizona Pine Woodland (10901)

Madrean Lower Montane Pine Woodland
Identifier: CES305.796.1 **MoRAP Code:** 10901
Description: Woodlands dominated by *Pinus ponderosa* (ponderosa pine), though oaks, junipers, and pinyon pines may be common.

Trans-Pecos: Ponderosa/Arizona Pine - Oak Woodland (10903)

Madrean Lower Montane Pine - Deciduous Oak Woodland
Identifier: CES305.796.2 **MoRAP Code:** 10903
Description: Woodlands co-dominated by *Pinus ponderosa* (ponderosa pine) and oak species such as *Quercus emoryi* (Emory oak), *Quercus gambelii* (Gambel oak), and *Quercus grisea* (gray oak).

Trans-Pecos: Mountain Evergreen Oak - Pine Shrubland (10905)

Madrean Lower Montane Pine – Evergreen Oak Shrubland
Identifier: CES305.796.3 **MoRAP Code:** 10905
Description: Shrublands representing young growth of the *Pinus ponderosa* (ponderosa pine) and *Quercus* spp. (oak) dominated woodlands. *Pinus cembroides* (Mexican pinyon pine) and *Juniperus deppeana* (alligator juniper) may be common components of the shrubland.

Trans-Pecos: Mountain Grassland (10907)

Madrean Lower Montane Savanna Grassland
Identifier: CES305.796.3 **MoRAP Code:** 10907
Description: This savanna represents the open, grassy interstices of the pine woodlands of higher elevations. Mid-height grasses such as *Piptochaetium fimbriatum* (pinyon ricegrass), *Muhlenbergia emersleyi* (bull muhly), *Muhlenbergia pauciflora* (New Mexican muhly), *Bouteloua curtipendula* (sideoats grama), *Heteropogon contortus* (tanglehead), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), and *Bouteloua gracilis* (blue grama) are common dominants.

Madrean Upper Montane Conifer - Oak Forest and Woodland

Identifier: CES305.798

Geology: On Permian limestone in the Guadalupe Mountains. In the Chisos Mountains, this system primarily occurs on Tertiary igneous formations and associated colluvial and alluvial deposits from these formations.

Landform: High mountain slopes and flats and rolling topography at mountain summits of the Guadalupe and Chisos Mountains.

Soils: Victorio-Lorenz-Rock outcrop complex of the Guadalupe Mountains, and Igneous Hill and Mountain soils of the Chisos Mountains.

Description: This system is limited in Texas to the highest mountain areas of the Guadalupe and Chisos Mountains, but is lacking from high elevations of the Davis Mountains. The characteristic dominants of the system are *Pseudotsuga menziesii* (Douglas-fir) and *Pinus strobiformis* (southwestern white pine), though *Pinus ponderosa* (ponderosa pine), *Juniperus* spp. (junipers) and *Pinus cembroides* (Mexican pinyon pine) or *Pinus edulis* (pinyon pine) may also be present to common. Oak species, including *Quercus emoryi* (Emory oak), *Quercus hypoleucoides* (silverleaf oak), *Quercus grisea* (gray oak), and *Quercus gambelii* (Gambel oak) may be present to co-dominant. The shrub and subcanopy is typically sparse and generally dominated by species from the canopy. In some areas, *Quercus gambelii* (Gambel oak) may form dense shrub patches. The herbaceous layer is typically dominated by graminoids, including species such as *Festuca arizonica* (Arizona fescue), *Muhlenbergia pauciflora* (New Mexican muhly), *Piptochaetium fimbriatum* (pinyon ricegrass), *Blepharoneuron tricholepis* (pine dropseed), *Koeleria macrantha* (junegrass), and *Poa fendleriana* (mutton bluegrass).

VEGETATION TYPES:

Trans-Pecos: High Mountain Conifer Forest and Woodland (12601)

Madrean Upper Montane Conifer Forest and Woodland
Identifier: CES305.798.1 **MoRAP Code:** 12601
Description: This type is dominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Pinus strobiformis* (southwestern white pine), *Pinus ponderosa* (ponderosa pine), *Pinus arizonica* (Arizona pine, in the Chisos Mountains), and/or *Juniperus* spp. (junipers).

Trans-Pecos: High Mountain Mixed Conifer - Oak Forest and Woodland (12603)

Madrean Upper Montane Conifer - Oak Forest and Woodland
Identifier: CES305.798.2 **MoRAP Code:** 12603
Description: Occurrences are codominated by conifers such as *Pseudotsuga menziesii* (Douglas fir), *Pinus strobiformis* (southwestern white pine), and other pine and juniper species, as well as oak species such as *Quercus emoryi* (Emory oak), *Quercus grisea* (gray oak), *Quercus hypoleucoides* (silverleaf oak), and *Quercus gambelii* (Gambel oak).

Trans-Pecos: High Mountain Evergreen Shrubland (12605)

Madrean Upper Montane Conifer Shrubland
Identifier: CES305.798.3 **MoRAP Code:** 12605

Description: Shrublands at high elevations, typically within a matrix of other vegetation types within the system and dominated by young individuals of the canopy species.

Madrean Encinal

Identifier: CES305.795

Geology: This system may occur on various substrates including Permian limestones of Guadalupe Mountains, Tertiary igneous formations, and sandstone formation, and even colluvial/alluvial substrates at middle elevations in mountainous areas of the Trans-Pecos.

Landform: Mountain slopes and rolling uplands in mountainous areas.

Soils: This system may occur on a wide range of soils, often rocky or gravelly, derived from limestone, sandstone, or igneous parent material. It may also occur on loams and alluvial surfaces.

Description: This system sometimes co-occurs with the Madrean Pinyon-Juniper Woodland and also grades into the Madrean Lower Montane Pine-Oak Forest and Woodland at higher elevations. It may replace the pinyon-juniper woodland at lower elevations and grade into desert grasslands, desert shrublands or montane chaparral. These lower elevation occurrences tend to be more open woodlands and savannas. Oak species typically dominate these woodlands with species such as *Quercus grisea* (gray oak), *Quercus emoryi* (Emory oak), *Quercus hypoleucoides* (silverleaf oak), *Quercus arizonica* (Arizona white oak), and/or *Quercus rugosa* (netleaf oak). On limestone, *Quercus mohriana* (Mohr's shin oak) may be common. Various pine and juniper species, such as *Juniperus deppeana* (alligator juniper), *Pinus cembroides* (Mexican pinyon pine), *Pinus edulis* (pinyon pine, in the Guadalupe Mountains region), may be conspicuous elements of the canopy. This system may be present as a shrubland, closed woodland, or open woodland. In addition to the oak, pine, and juniper species, other shrubs that may be encountered include *Mimosa aculeaticarpa* var. *biuncifera* (catclaw mimosa), *Mimosa dysocarpa* (velvetpod mimosa), *Rhus trilobata* (skunkbush sumac), and *Cercocarpus montanus* (mountain mahogany). *Viguiera stenoloba* (skeleton-leaf golden eye), *Parthenium incanum* (mariola), and other species common to the deserts of lower elevations may be present to common. *Nolina texana* (Texas sacahuista), *Dasylirion leiophyllum* (smooth sotol), *Opuntia imbricata* (tree cholla), and *Agave* spp. (agaves) are commonly encountered. The herbaceous layer is typically dominated by graminoids such as *Muhlenbergia emersleyi* (bull muhly), *Bouteloua curtipendula* (sideoats grama), *Bouteloua gracilis* (blue grama), *Bouteloua hirsuta* (hairy grama), *Bouteloua eriopoda* (black grama), *Piptochaetium fimbriatum* (pinyon ricegrass), and *Heteropogon contortus* (tanglehead), but this layer may be sparse.

VEGETATION TYPES:

Trans-Pecos: Gray Oak Savanna and Woodland (10702)

Madrean Evergreen Encinal

Identifier: CES305.795.1 **MoRAP Code:** 10702

Description: This type is an oak woodland dominated by evergreen oaks.

Trans-Pecos: Mixed Oak Savanna and Woodland (10703)

Madrean Encinal
Identifier: CES305.795.2 **MoRAP Code:** 10703
Description: Oaks of various species may dominate these woodlands.

Madrean Juniper Savanna
Identifier: CES301.730

Geology: Associated with various substrates including limestones, sandstones, igneous formations, and alluvial/colluvial surfaces.
Landform: This system typically occupies foothills and lower slopes of mountains. Such situations may often be rolling landscapes, and are sometimes on gentle slopes to level surfaces.
Soils: The soils occupied by the system vary from gravelly, to shallow to loamy soils. It may also occur on rocky slopes of limestone or igneous parent material.

Description: This system often co-occurs with the Madrean Pinyon-Juniper Woodland, but often occupies slightly lower elevations. It is similar to that system but lacks pinyon as a dominant, though some pinyon species (*Pinus cembroides* (Mexican pinyon pine), *Pinus edulis* (pinyon pine), or *Pinus remota* (paper-shell pinyon pine)) may be present. One of several juniper species may be the dominant overstory, including *Juniperus monosperma* (one-seeded juniper), *Juniperus pinchotii* (redberry juniper), *Juniperus coahuilensis (rose-fruited juniper)*, or *Juniperus deppeana* (alligator juniper). The system may occur with junipers forming a shrubland, or as a closed woodland, or, more commonly, as an open woodland. *Nolina texana* (Texas sacahuista), *Dasylirion leiophyllum* (smooth sotol), and *Yucca* spp. (yuccas) are commonly encountered. This system typically gives way at lower elevations to grassland, with species such as *Bouteloua gracilis* (blue grama), *Bouteloua curtipendula* (sideoats grama), *Bouteloua eriopoda* (black grama), *Muhlenbergia emersleyi* (bull muhly), and *Muhlenbergia setifolia* (curlyleaf muhly) commonly encountered in the herbaceous layer.

VEGETATION TYPE:

Trans-Pecos: Juniper Savanna and Woodland (10805)

Madrean Juniper Savanna
Identifier: CES301.730
Description: As described for system.

Edwards Plateau Limestone Savanna and Woodland
Identifier: CES303.660

Geology: Primarily found on Cretaceous limestones of the Edwards Plateau.
Landform: Rolling to level topography, often on plateau tops, but also on gentle slopes.

Soils: Generally loams, clay loams, or clays, often with limestone parent material apparent. Low Stony Hill, Adobe, Clay Loam, and Shallow Ecological Sites are commonly associated with this system.

Description: This upland system forms the matrix vegetation type of the Edwards Plateau. It is typified by a mosaic of evergreen oak and juniper forests, woodlands and savannas over shallow soils of rolling uplands and adjacent upper slopes within the Edwards Plateau and some adjacent ecoregions where limestone is present. This system is less pronounced in Phase 5, due to the more xeric nature of the western edge of the Edwards Plateau. Significant open areas dominated by grasses may resemble prairies, and such open occurrences may grade into prairie types to the northwest (shortgrass prairie) and northeast (Central mixedgrass) within Phase 5. Species such as *Quercus fusiformis* (plateau live oak) or *Juniperus ashei* (Ashe juniper) often dominate the canopy of this system. Other canopy species may include *Quercus vaseyana* (Vasey shin oak), *Pinus remota* (paper-shell pinyon), and *Juniperus pinchotii* (redberry juniper). The shrub layer may be fairly well-developed, containing overstory species, as well as species such as *Diospyros texana* (Texas persimmon), *Mahonia trifoliolata* (agarito), *Sophora secundiflora* (Texas mountain-laurel), *Opuntia engelmannii* var. *lindheimeri* (Lindheimer pricklypear), *Prosopis glandulosa* (honey mesquite), and *Cylindropuntia leptocaulis* (tasajillo). The understory can contain various grass species, including *Schizachyrium scoparium* (little bluestem), *Aristida purpurea* (purple threeawn), *Bouteloua curtipendula* (sideoats grama), *Bothriochloa barbinodis* (cane bluestem), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Nassella leucotricha* (Texas wintergrass), *Hilaria belangeri* (curly-mesquite), *Bouteloua dactyloides* (buffalograss), *Bouteloua hirsuta* (hairy grama), *Bouteloua rigidiseta* (Texas grama), and/or *Carex planostachys* (cedar sedge). The composition of the grassland component is driven by grazing, fire, and climate.

VEGETATION TYPES:

Edwards Plateau: Ashe Juniper Motte and Woodland (1101)

Edwards Plateau Limestone Ashe Juniper Motte and Woodland
Identifier: CES303.660.1 **MoRAP Code:** 1101
Description: These relatively closed woodlands are infrequent on uplands on limestone on the western edge of the Edwards Plateau. *Juniperus ashei* (Ashe juniper) is the clear dominant in the canopy and a conspicuous component of the shrub layer as well, though *Juniperus pinchotii* (redberry juniper) becomes increasingly common to the west. Occurrences containing thick stands of juniper are sometimes referred to as "cedar breaks." Other species such as *Quercus vaseyana* (Vasey shin oak), *Ulmus crassifolia* (cedar elm), *Pinus remota* (paper-shell pinyon), and *Celtis* spp. (hackberry) may be common. The shrub layer may be dense and dominated by *Juniperus ashei* (Ashe juniper) or *Juniperus pinchotii* (redberry juniper), but *Mahonia trifoliolata* (agarito), *Sophora secundiflora* (Texas mountain-laurel), *Diospyros texana* (Texas persimmon), and other species may be present. Dense canopy cover often leads to a sparse to nearly absent herbaceous layer, sometimes with only *Carex planostachys* (cedar sedge) present. In the southwestern portion of the Edwards Plateau, *Pinus remota* (paper-shell pinyon) may be a common in the overstory. These sites tend to appear more open, but retain *Juniperus ashei* (Ashe juniper) or *Juniperus pinchotii* (redberry juniper) as a significant component

of the overstory and shrub layers. Pinyon woodlands tend to occur on relatively xeric sites and have a sparse herbaceous layer with species such as *Bouteloua curtipendula* (sideoats grama), *Hilaria belangeri* (curly-mesquite), *Erioneuron pilosum* (hairy tridens), and others.

Western Great Plains Mesquite Woodland and Shrubland

Identifier: CES303.668

Geology: This system typically occupies Quaternary Alluvium.

Landform: Along drainages and low landscape positions, especially where deep soils have developed.

Soils: Draw and Bottomland Ecological Sites of the High Plains and northwestern portions of the Edwards Plateau.

Description: From the perspectives of composition and physiognomy, this system is difficult to distinguish from areas where *Prosopis glandulosa* (honey mesquite) has invaded other systems. In the context of mapping, we have limited this system to low landscape positions, particularly along drainages where significant soil accumulation has occurred. Occurrences often occupy loams and clay loams along drainages and in bottomlands of the High Plains and northwestern portion of the Edwards Plateau. Sites are typically dominated by *Prosopis glandulosa* (honey mesquite), which usually forms a shrubland, but may occur as a low tree canopy (less than 8 m in height). Woodlands typically have an open aspect due to the low leaf area presented by the *Prosopis glandulosa* (honey mesquite) canopies. *Ziziphus obtusifolia* (lotebush), *Juniperus pinchotii* (redberry juniper), *Opuntia engelmannii* var. *lindheimeri* (Lindheimer pricklypear), and *Mahonia trifoliolata* (agarito) may be conspicuous components of the shrub layer. The herbaceous layer is dominated by grasses such as *Pleuraphis mutica* (tobosa), *Bouteloua curtipendula* (sideoats grama), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Hilaria belangeri* (curly-mesquite), *Nassella leucotricha* (Texas wintergrass), *Aristida purpurea* (purple threeawn), and *Tridens muticus* (slim tridens).

VEGETATION TYPES:

High Plains: Mesquite Shrubland (5406)

Identifier: CES303.668.2 **MoRAP Code:** 5406

Description: As described for the system, characterized by shrubs less than 4 m in height, and/or taller and sparser overstory canopy.

Rocky Mountain Aspen Forest and Woodland (Not Mapped)

Identifier: CES306.813

Geology: High elevations on Permian limestone (Guadalupe Mountains) and igneous substrates (Davis and Chisos Mountains).

Landform: High mountain slopes, valleys and ridges.

Soils: Various.

Description: This system occurs at high elevations of the Guadalupe, Davis, and Chisos Mountains. It typically occurs as small patches within the higher elevation conifer systems present in each of the ranges. *Populus tremuloides* (quaking aspen) dominate the stands, which are maintained by disturbance, but may also occupy talus slopes for extended periods. These patches are considered relictual remnants in this southwestern extension of this more commonly encountered type further north.

VEGETATION TYPE:

Rocky Mountain: Aspen Woodland (Not Mapped)

Rocky Mountain Aspen Forest and Woodland
Identifier: CES306.813 **MoRAP Code:** Not Mapped
Description: As described for system.

Shrublands

Edwards Plateau Limestone Shrubland
Identifier: CES303.041

Geology: Often on massive limestone such as Edwards or related formations.
Landform: This system may occur on plateaus, or slopes, and may often form a discontinuous band around a plateau edge as it breaks into the adjacent slope.
Soils: Soils are characterized by Shallow or Very Shallow Ecological Sites, but may also be found on other Ecological Sites, including Limestone Hill, Adobe, Low Stony Hill and Steep Rocky.

Description: This system may be represented by extensive continuous shrub cover, or as a patchy, discontinuous shrubland, often with scattered emergent overstory trees. The sparse emergent overstory may have *Quercus vaseyana* (Vasey shin oak), *Juniperus pinchotii* (redberry juniper), *Pinus remota* (paper-shell pinyon) and/or *Juniperus ashei* (Ashe juniper). Shrub cover may be dominated by these species, or may be represented as an assemblage of a rather diverse array of species including *Rhus virens* (evergreen sumac), *Cercis canadensis* var. *texensis* (Texas redbud), *Forestiera pubescens* (elbow-bush), *Forestiera reticulata* (netleaf forestiera), *Ungnadia speciosa* (Mexican buckeye), *Sophora secundiflora* (Texas mountain-laurel), *Diospyros texana* (Texas persimmon), *Salvia ballotiflora* (shrubby blue sage), *Mimosa borealis* (fragrant mimosa), *Condalia hookeri* (brasil), *Rhus trilobata* (skunkbush sumac), *Opuntia engelmannii* var. *lindheimeri* (Lindheimer pricklypear), and *Mahonia trifoliolata* (agarito). This system also includes *Quercus mohriana* (Mohr's shin oak) or *Quercus vaseyana* (Vasey shin oak) dominated shrublands. Herbaceous cover may be patchy and is generally graminoid, with species including *Schizachyrium scoparium* (little bluestem), *Bouteloua curtipendula* (sideoats grama), *Bouteloua rigidiseta* (Texas grama), *Bouteloua trifida* (red grama), *Hilaria belangeri* (curly-mesquite), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Nassella leucotricha* (Texas wintergrass), *Erioneuron pilosum* (hairy tridens), *Aristida* spp. (threeawn), and others. Disturbances such as fire may be important processes maintaining this system. However, it appears to persist on thin-soiled sites. To the west, semi-arid conditions result in the replacement of upland woodlands with shrublands. *Juniperus pinchotii* (redberry juniper) increasingly replaces *Juniperus ashei* (Ashe juniper) in this semi-arid region, and shrubs such as *Prosopis glandulosa* (honey mesquite), *Leucophyllum frutescens* (cenizo), *Acacia berlandieri* (guajillo), *Mimosa aculeaticarpa* var. *biuncifera* (catclaw mimosa), and *Condalia viridis* (green condalia) become increasingly common. Succulents such as *Dasylirion texanum* (Texas sotol), *Nolina texana* (Texas sacahuista), and *Agave lechuguilla* (lechuguilla) also become increasingly common. In these situations, sometimes large patches are dominated by grasses such as *Bouteloua trifida* (red grama), *Bouteloua curtipendula* (sideoats grama), *Hilaria belangeri* (curly-mesquite), *Erioneuron pilosum* (hairy tridens), *Tridens muticus* (slim tridens), and *Nassella leucotricha* (Texas wintergrass). Interestingly, non-native grasses such as *Bothriochloa ischaemum* var. *songarica* (King Ranch bluestem) are less frequently encountered as dominants of occurrences in the semi-arid west, than in less xeric sites to the east. This system transitions to shrublands more characteristic of the Chihuahuan Desert region as conditions become more xeric

to the west, often with conspicuous increases in succulents such as *Dasylirion texanum* (Texas sotol), *Nolina texana* (Texas sacahuista), *Agave lechuguilla* (lechuguilla), and even *Fouquieria splendens* (ocotillo).

VEGETATION TYPES:

Edwards Plateau: Juniper Semi-arid Shrubland (1215)

Edwards Plateau Limestone Semi-arid Juniper Shrubland
Identifier: CES303.041.19 **MoRAP Code:** 1215
Description: This shrubland is commonly encountered on the western portions of the Edwards Plateau and is dominated by *Juniperus pinchotii* (redberry juniper) or *Juniperus ashei* (Ashe juniper) shrubs. A sparse overstory canopy of *Juniper* sp. (juniper), *Quercus fusiformis* (plateau live oak), *Pinus remota* (paper-shell pinyon), and/or *Prosopis glandulosa* (honey mesquite) may be present. Other shrub species commonly encountered include *Prosopis glandulosa* (honey mesquite), *Mahonia trifoliolata* (agarito), *Diospyros texana* (Texas persimmon), *Leucophyllum frutescens* (cenizo), and *Acacia berlandieri* (guajillo). *Opuntia engelmannii* var. *lindheimeri* (Lindheimer pricklypear) and *Dasylirion texanum* (Texas sotol) are commonly encountered succulents.

Edwards Plateau: Deciduous Semi-arid Shrubland (1216)

Edwards Plateau Semi-arid Deciduous Shrubland
Identifier: CES303.041.20 **MoRAP Code:** 1216
Description: This shrubland occurs within the more arid regions of the western portions of the Edwards Plateau. Dominant shrub species within this type include *Diospyros texana* (Texas persimmon), *Prosopis glandulosa* (honey mesquite), *Quercus vaseyana* (Vasey shin oak), *Salvia ballotiflora* (shrubby blue sage), *Mahonia trifoliolata* (agarito), *Condalia* sp. (condalia), *Sophora secundiflora* (Texas mountain-laurel), and *Acacia berlandieri* (guajillo). Succulents, including *Dasylirion texanum* (Texas sotol), *Nolina texana* (Texas sacahuista), *Opuntia engelmannii* var. *lindheimeri* (Lindheimer pricklypear), and *Agave lechuguilla* (lechuguilla), are commonly encountered in the driest, rockiest situations. *Juniperus pinchotii* (redberry juniper), *Juniperus ashei* (Ashe juniper) and/or *Quercus fusiformis* (plateau live oak), may be present, but sites are dominated by deciduous shrubs.

Edwards Plateau: Juniper Semi-arid Slope Shrubland (1235)

Edwards Plateau Limestone Semi-arid Juniper Slope Shrubland
Identifier: CES303.041.21 **MoRAP Code:** 1235
Description: This shrubland occurs on slopes greater than 20% in the western portions of the Edwards Plateau. They are dominated by *Juniperus pinchotii* (redberry juniper) and/or *Juniperus ashei* (Ashe juniper), but often have other deciduous shrub components (see Edwards Plateau: Juniper Semi-arid Shrubland).

Edwards Plateau: Deciduous Semi-arid Slope Shrubland (1236)

Edwards Plateau Limestone Semi-arid Deciduous Slope Shrubland
Identifier: CES303.041.22 **MoRAP Code:** 1236

Description: Shrublands of the western portion of the Edwards Plateau occurring on slopes greater than 20% and dominated by deciduous shrub species as described for Edwards Plateau: Deciduous Semi-arid Shrubland.

Edwards Plateau: Semi-arid Grassland (1207)

Identifier: CES303.041.23 **MoRAP Code:** 1207

Description: These grasslands form the interstices of the shrubland matrix of the western portion of the Edwards Plateau, sometimes occurring as extensive areas with reduced cover of woody and succulent species (though scattered individuals of woody species of the system may be present). Level plateau tops often harbor extensive occurrences of this type. Grasses such as *Aristida purpurea* (purple threeawn), *Bouteloua trifida* (red grama), *Bouteloua curtipendula* (sideoats grama), *Hilaria belangeri* (curly-mesquite), *Erioneuron pilosum* (hairy tridens), *Tridens muticus* (slim tridens), *Nassella leucotricha* (Texas wintergrass), and/or *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem) are common dominants.

Llano Estacado Caprock Escarpment and Breaks Shrubland and Steppe

Identifier: CES303.725

Geology: This system occurs at the escarpment where the level plain of the Ogallala Formation drops off precipitously to the east. The base of the escarpment includes formations from the Cretaceous and Triassic (in Phase 5), and also Quaternary alluvium.

Landform: This system is associated with steep slopes of the escarpment, but may also occur on relatively level areas directly upslope and downslope of the escarpment.

Soils: Shallow soils adjacent to the escarpment characterize this system.

Description: This system ranges from sparsely vegetated to shrubland, to sparse woodland. It occupies the escarpment representing the southeastern edge of the High Plains where sharp erosional slopes occur. The canopy can be sparse, and often significant areas of bare ground or rock are conspicuous. The vegetation can sometimes be represented by a dense shrub layer dominated by species such as *Quercus mohriana* (Mohr's shin oak), *Juniperus pinchotii* (redberry juniper), *Juniperus ashei* (Ashe juniper), *Cercocarpus montanus* (mountain mahogany), *Dalea formosa* (feather dalea), *Rhus trilobata* (skunkbush sumac), *Prosopis glandulosa* (honey mesquite), and *Gutierrezia sarothrae* (broom snakeweed). Individuals of some of these species may occasionally reach the stature of trees and form a sparse overstory canopy. The herbaceous layer may be moderately well-developed to sparse and is usually dominated by mid- to short grasses such as *Aristida purpurea* (purple threeawn), *Bouteloua curtipendula* (sideoats grama), *Bouteloua gracilis* (blue grama), *Bouteloua hirsuta* (hairy grama), and *Schizachyrium scoparium* (little bluestem). Forbs, including species such as *Artemisia ludoviciana* (western mugwort), *Calylophus* sp. (sundrops), *Chaetopappa ericoides* (heath least-daisy), *Krameria lanceolata* (trailing ratany), and *Melampodium leucanthum* (plains blackfoot) may be present.

VEGETATION TYPES:

Rolling Plains: Breaks Evergreen Shrubland (2105)

Llano Estacado Caprock Escarpment and Break Evergreen Shrubland
Identifier: CES303.725.1 **MoRAP Code:** 2105
Description: Occurrences representing shrublands dominated by evergreen species such as *Juniperus pinchotii* (redberry juniper) or *Juniperus ashei* (Ashe juniper).

Rolling Plains: Breaks Deciduous Shrubland (2106)

Llano Estacado Caprock Escarpment and Break Deciduous Shrubland
Identifier: CES303.725.2 **MoRAP Code:** 2106
Description: Occurrences of the system representing shrublands dominated by deciduous species such as *Quercus mohriana* (Mohr's shin oak), *Dalea formosa* (feather dalea), and *Cercocarpus montanus* (mountain mahogany). *Juniperus* spp. (junipers) may be present, but are not dominant.

Chihuahuan Mixed Desert and Thornscrub
Identifier: CES302.734

Geology: This system is particularly well-developed on limestone, but can occur on various other substrates.
Landform: Occupying limestone hills and slopes, gravel-capped ridges and slopes, as well as hills and slopes of igneous and sandstone substrates.
Soils: Rocky soils of Igneous Hill and Mountain, Limestone Hill and Mountain and other ecoclasses.

Description: In this phase, this ecological system is widely distributed and often occupies footslopes and hilly landforms of limestones, sandstones, and igneous strata, though it is best developed on limestones. This shrubland can occur in proximity to Apacherian – Chihuahuan Semi-Desert Grassland and Steppe, Chihuahuan Creosotebush Desert Scrub, and/or Chihuahuan Succulent Desert Scrub. *Larrea tridentata* (creosotebush), *Parthenium incanum* (mariola), *Condalia ericoides* (javelina bush), *Mimosa aculeaticarpa* var. *biuncifera* (catclaw mimosa), *Yucca torreyi* (Torrey's yucca), *Acacia constricta* (whitethorn acacia), *Agave lechuguilla* (lechuguilla), *Dasylirion leiophyllum* (smooth sotol), *Viguiera stenoloba* (skeleton-leaf golden eye), *Leucophyllum* spp. (cenizo), and *Prosopis glandulosa* (honey mesquite) are often present to dominant, but numerous shrub species may be present. It differs from Chihuahuan Creosotebush Desert Scrub in having a diversity of shrub species present and is not a nearly monotypic stand of *Larrea tridentata* (creosotebush). Herbaceous cover is generally low with species such as *Bouteloua eriopoda* (black grama), *Bouteloua ramosa* (chino grama), *Bouteloua curtipendula* (sideoats grama), *Bouteloua trifida* (red grama), *Aristida purpurea* (purple threeawn), *Dasyochloa pulchella* (fluffgrass), and *Muhlenbergia setifolia* (curlyleaf muhly).

VEGETATION TYPE:

Trans-Pecos: Mixed Desert Shrubland (8306)

Chihuahuan Mixed Desert and Thornscrub
Identifier: CES302.734.1 **MoRAP Code:** 8306

Description: As described for system.

Chihuahuan Succulent Desert Scrub
Identifier: CES302.738

Geology: Typically associated with limestones, but can also be found on gravels, igneous and sandstone substrates.
Landform: Often on rocky or gravelly slopes.
Soils: Rocky or gravelly sites derived from limestone, calcareous gravel deposits, sandstone or igneous. Igneous Hill and Mountain, Limestone Hill and Mountain, Sandstone Hill, Limestone Hill, Gravelly, and similar ecoclasses may be occupied by this system.

Description: This system typically occupies dry slopes with significant exposed rock (typically limestone) or gravel. Shrub species such as *Larrea tridentata* (creosotebush), *Parthenium incanum* (mariola), *Viguiera stenoloba* (skeleton-leaf golden eye) (agarito), and *Forestiera angustifolia* (desert olive) may be present, but succulents such as *Yucca torreyi* (Torrey's yucca), *Dasylirion texanum* (Texas sotol), *Agave lechuguilla* (lechuguilla), *Fouquieria splendens* (ocotillo), *Dasylirion leiophyllum* (smooth sotol), *Euphorbia antisyphilitica* (candelilla), and *Opuntia* spp. (pricklypears) are conspicuous and are the aspect dominants. Overall cover is generally low and bare rock is easily visible in most occurrences. Herbaceous cover is low with grasses such as *Bouteloua eriopoda* (black grama), *Bouteloua ramosa* (chino grama), and *Bouteloua curtipendula* (sideoats grama) sometimes present. Fern and fern allies such as *Astrolepis* spp. (cloakferns), *Cheilanthes* spp. (lipferns) and *Selaginella lepidophylla* (resurrection plant) are often common.

VEGETATION TYPE:

Trans-Pecos: Succulent Desert Scrub (8406)
Chihuahuan Succulent Desert Scrub
Identifier: CES302.738.1 **MoRAP Code:** 8406
Description: As described for system.

Chihuahuan Creosotebush Desert Scrub
Identifier: CES302.731

Geology: Generally occurs on alluvial/colluvial gravel flats.
Landform: Flat to gently rolling landforms occupying outwash plains and basins between mountain ranges.
Soil: Typically occurs on gravelly soils.

Description: This system typically occurs on flat and gently rolling landforms, often on gravelly alluvial plains occupying outwash plains and those on intermountain basins. *Larrea tridentata*

(creosotebush) is usually the clear dominant, though species such as *Parthenium incanum* (mariola), *Acacia constricta* (whitethorn acacia), *Flourensia cernua* (tarbush), and/or *Prosopis glandulosa* (honey mesquite) may be present. On some sites, particularly hot desert sites at low elevations, succulents such as *Fouquieria splendens* (ocotillo), *Agave lechuguilla* (lechuguilla), *Yucca torreyi* (Torrey's yucca), *Opuntia* spp. (pricklypears), and *Echinocereus* spp. (hedgehog cacti) may be conspicuous.

VEGETATION TYPES:

Trans-Pecos: Sparse Creosotebush Scrub (8200)

Chihuahuan Sparse Creosotebush Desert Scrub
Identifier: CES302.731.1 **MoRAP Code:** 8200
Description: This type occupies areas of the intermontane basin plains with low vegetative cover, often with significant desert pavement under a sparse canopy of almost monotypic *Larrea tridentata* (creosotebush).

Trans-Pecos: Creosotebush Scrub (8205)

Chihuahuan Creosotebush Desert Scrub
Identifier: CES302.731.2 **MoRAP Code:** 8205
Description: This is the typical expression for the system occupying large areas of the intermontane basins and with *Larrea tridentata* (creosotebush) as the clear, often monotypic dominant.

Trans-Pecos: Creosotebush - Succulent Scrub (8206)

Chihuahuan Sparse Creosotebush - Succulent Desert Scrub
Identifier: CES301.731.3 **MoRAP Code:** 8206
Description: This vegetation type occurs on dissected gravelly flats at low elevation, in the hot desert of the southern Trans-Pecos. Vegetated cover is usually fairly low and is dominated by *Larrea tridentata* (creosotebush), *Fouquieria splendens* (ocotillo), and other succulents.

Western Great Plains Sandhill Steppe
Identifier: CES303.671

Geology: Aeolian sands.
Landform: Rolling sandhills and level sandy plains.
Soils: Deep sands, sandhills, and sandy sites.

Description: This system is generally a shrubland interspersed with sandy prairie and sparsely vegetated dunes and sandy flats, best developed in this phase in the vicinity of the Monahans Sand Country. Occurrences in this phase represent the southeastern extent of this system as it transitions into the sandy vegetation of the Chihuahuan Desert. *Quercus havardii* (Havard's shin oak) characterizes this system in the phase and occurs either as large patches relatively monotypic in aspect, or as a component of a more diverse shrubland. *Artemisia filifolia* (sand sage) and *Prosopis glandulosa* (honey mesquite) are significant canopy dominants over much of

the range. Other common shrubs and succulents encountered in the system include *Atriplex canescens* (four-wing saltbush), *Penstemon ambiguus* (pink plains penstemon), *Yucca campestris* (plains yucca), *Cylindropuntia leptocaulis* (tasajillo), and *Chrysothamnus pulchellus* (southwest rabbitbrush). In basins where some water accumulates woodlands of *Prosopis glandulosa* (honey mesquite) and *Sapindus saponaria* var. *drummondii* (western soapberry) may develop. The herbaceous layer is generally well-developed except where vegetative cover is completely lacking or where cover of *Quercus havardii* (Havard's shin oak) is continuous and dense. The herbaceous layer is typically dominated by graminoids, but with significant forb diversity. Grasses present to dominant in the layer include *Sporobolus giganteus* (giant dropseed), *Sporobolus cryptandrus* (sand dropseed), *Andropogon hallii* (sand bluestem), *Schizachyrium scoparium* (little bluestem), *Paspalum setaceum* (thin paspalum), *Cenchrus spinifex* (common sandbur), *Panicum havardii* (Havard panicum), *Chloris cucullata* (hooded windmillgrass), and *Calamovilfa gigantea* (big sandreed). Forbs may at times constitute an aspect dominant with their prolific show of flowers. Species such *Helianthus petiolaris* (plains sunflower), *Cnidoscolus texanus* (Texas bull-nettle), *Dimorphocarpa candicans* (spectaclepod), *Gaillardia pulchella* (Indian blanket), *Eriogonum annuum* (annual wildbuckwheat), *Heliotropium convolvulaceum* (bindweed heliotrope), *Mentzelia nuda* (bractless mentzelia), *Palafoxia sphacelata* (sand palafoxia), and *Dalea lanata* (wooly dalea) are among the forbs that may be present. Western Great Plains Sand Prairie is mapped where extensive areas with significant herbaceous cover and minimal shrub cover occur.

VEGETATION TYPES:

High Plains: Active Sand Dunes (2800)

Western Great Plains Sandhill Dunes
Identifier: CES303.671.1 **MoRAP Code:** 2800
Description: Sparsely vegetated dunes are included here as they are a common component of the mosaic that represents this system.

High Plains: Sandy Deciduous Shrubland (2805)

Western Great Plains Sandhill Deciduous Shrubland
Identifier: CES303.671.2 **MoRAP Code:** 2805
Description: This shrubland occurs on relatively sandy plains, as opposed to the rolling dune lands. It is typically dominated by species other than *Quercus havardii* (Havard's shin oak), though it is often present. *Artemisia filifolia* (sand sage) and *Prosopis glandulosa* (honey mesquite) are common dominants. Understory cover varies from significant herbaceous cover to sparsely vegetated.

High Plains: Sandy Shinnery Shrubland (2806)

Western Great Plains Sandy Shinnery Shrubland
Identifier: CES303.671.3 **MoRAP Code:** 2806
Description: This shrubland, typically dominated by *Quercus havardii* (Havard's shin oak) on sandy plains, as opposed to rolling dunes. *Artemisia filifolia* (sand sage) and *Prosopis glandulosa* (honey mesquite) are common constituents, or *Quercus havardii* (Havard's shin oak) may have nearly continuous cover. Herbaceous cover is variable.

High Plains: Sandhill Deciduous Shrub Duneland (2810)

Western Great Plains Sandhill Deciduous Shrub Duneland
Identifier: CES303.671.4 **MoRAP Code:** 2810
Description: Deciduous shrubland of rolling dunes and sandhills, with less cover of *Quercus havardii* (Havard's shin oak) and more cover of *Artemisia filifolia* (sand sage) and *Prosopis glandulosa* (honey mesquite).

High Plains: Sandhill Shinnery Duneland (2816)

Western Great Plains Sandhill Shinnery Duneland
Identifier: CES303.671.5 **MoRAP Code:** 2816
Description: Rolling dunes and sandhills dominated by *Quercus havardii* (Havard's shin oak), though *Artemisia filifolia* (sand sage) and *Prosopis glandulosa* (honey mesquite) are often present.

Madrean Oriental Chaparral
Identifier: CES302.031

Geology: Various formations at higher elevations of the mountains of West Texas, including the Permian limestones of the Guadalupe Mountain region, Tertiary igneous formations, and sedimentary formations including limestone and sandstone elsewhere.
Landform: Montane slopes
Soils: Rocky and gravelly slopes, often with little soil development.

Description: This system occurs at elevations above desert shrublands on dry rocky habitats of foothills, mountains, and canyons. It often occurs at elevations coincident with the occurrence of Madrean Encinal and Madrean coniferous woodlands, but typically occupies more xeric sites, often with steeper slopes and less soil development. Shrub cover is typically moderate to dense. Oak species such as *Quercus grisea* (gray oak), *Quercus vaseyana* (Vasey shin oak), *Quercus pungens* (sandpaper oak), *Quercus x pauciloba* (wavyleaf oak), *Quercus turbinella* (scrub oak), *Quercus mohriana* (Mohr's shin oak), and *Quercus gambelii* (Gambel oak) occurring as shrubs may be present to dominant making distinguishing this system from Madrean Encinal sometimes difficult. Other shrub species that are commonly encountered to dominant, include *Cercocarpus montanus* (mountain mahogany), *Pinus cembroides* (Mexican pinyon pine) or *Pinus edulis* (pinyon pine, in the Guadalupe Mountain region), *Ceanothus greggii* (desert ceanothus), *Fallugia paradoxa* (Apache plume), *Rhus virens* (evergreen sumac), *Garrya wrightii* (Wright's silktassel), *Aloysia wrightii* (Wright's beebrush), *Juniperus pinchotii* (redberry juniper), *Chrysactinia mexicana* (damianita), *Fraxinus greggii* (little-leaf ash), and *Viguiera stenoloba* (skeleton-leaf golden eye). *Dasylirion leiophyllum* (smooth sotol), *Nolina texana* (Texas sacahuista), *Agave lechuguilla* (lechuguilla), and *Opuntia engelmannii* var. *engelmannii* (Engelmann pricklypear) are frequently encountered. Herbaceous cover is patchy and bare rock is frequently visible. Graminoids dominate the herbaceous layer with species such as *Bouteloua curtipendula* (sideoats grama), *Bouteloua hirsuta* (hairy grama), *Muhlenbergia emersleyi* (bull muhly), *Muhlenbergia pauciflora* (New Mexican muhly), *Muhlenbergia setifolia* (curlyleaf muhly), *Achnatherum lobatum* (littleawn needlegrass), *Muhlenbergia dubia* (pine muhly), and *Heteropogon contortus* (tanglehead).

VEGETATION TYPES:

Trans-Pecos: Evergreen Chaparral (11005)

Madrean Oriental Deciduous Chaparral
Identifier: CES302.031.1 **MoRAP Code:** 11005
Description: Shrublands dominated by evergreen species that may include *Quercus mohriana* (Mohr's shin oak), *Quercus pungens* (sandpaper oak), *Quercus vaseyana* (Vasey shin oak), *Quercus turbinella* (scrub oak), and *Rhus virens* (evergreen sumac).

Trans-Pecos: Deciduous Chaparral (11006)

Madrean Oriental Evergreen Chaparral
Identifier: CES302.031.2 **MoRAP Code:** 11006
Description: Shrublands dominated by deciduous species.

Chihuahuan Mixed Salt Desert Scrub
Identifier: CES301.017

Geology: Quaternary alluvium.
Landform: Depressional basins and river floodplains.
Soils: Salty desert grassland, Salty Clay Fan, and Salty Bottomland ecological sites.

Description: This system usually occurs as an open-canopied shrubland surrounding saline basins, alluvial fans, and the salty bottomlands along the Pecos River. Substrates are fine-textured, alluvial, and saline. Species making up the often relatively sparse vegetative cover include *Atriplex canescens* (four-wing saltbush), *Allenrolfea occidentalis* (pickle-weed), *Suaeda suffrutescens* (desert seepweed), *Cylindropuntia leptocaulis* (tasajillo), *Prosopis glandulosa* var. *torreyana* (western honey mesquite), *Isocoma pluriflora* (southern Jimmy-weed), *Sesuvium verrucosum* (winged sea purslane), *Koeberlinia spinosa* (allthorn), *Atriplex acanthocarpa* (tubercled saltbush), *Flourensia cernua* (tarbush), and *Ziziphus obtusifolia* (lotebush). Non-native halophiles such as *Salsola tragus* (prickly Russian thistle), *Alhagi maurorum* (camelthorn), *Peganum harmala* (African rue), and *Tamarix* spp. (saltcedars) are commonly encountered to dominant. Graminoids commonly found, and sometimes constituting significant cover, include *Sporobolus airoides* (alkali sacaton), *Sporobolus wrightii* (big sacaton), *Distichlis spicata* (saltgrass), *Trichloris crinita* (false Rhodes grass), *Pappophorum bicolor* (pink pappusgrass), *Pleuraphis mutica* (tobosa), and *Scleropogon brevifolius* (burrograss).

VEGETATION TYPES:

Trans-Pecos: Salty Desert Scrub (10406)

Chihuahuan Mixed Salt Desert Scrub
Identifier: CES301.017.1 **MoRAP Code:** 10406
Description: Saline sites with significant shrub cover of species mentioned above.

Trans-Pecos: Salty Desert Grassland (10407)

Chihuahuan Mixed Salt Desert Grassland
Identifier: CES301.017.1 **MoRAP Code:** 10407
Description: Saline sites with significant graminoid cover of species mentioned above and lacking, or having sparse, shrub canopy cover.

Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub

Identifier: CES302.737
Geology: Aeolian sands associated with the Salt Basin west of the Guadalupe Mountains and the Hueco Bolson east of El Paso.
Landform: Rolling sand hills and hummocky sandy flats.
Soils: Sand Hill and Deep Sand Ecological Sites.

Description: This system includes shrubby sites on coppice dunes associated with aeolian sands of the Trans-Pecos, often resulting from degradation of grasslands of the North American Warm Desert Active and Stabilized Dunes or the Chihuahuan Sandy Plains Semi-Desert Grassland. *Prosopis glandulosa* (honey mesquite) and *Artemisia filifolia* (sand sage) are the commonest dominants, but other woody species include *Yucca elata* (soaptree yucca), *Cylindropuntia imbricata* (tree cholla), *Atriplex canescens* (four-wing saltbush), and *Ephedra* spp. (mormon-tea). Herbaceous species of the adjacent grasslands are common.

VEGETATION TYPE:

Trans-Pecos: Desert Deep Sand and Dune Scrub (10607)

Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub
Identifier: CES302.737 **MoRAP Code:** 10607
Description: As described for system.

Rocky Mountain Gambel Oak - Mixed Montane Shrubland

Identifier: CES306.818

Geology: Primarily limestone formations of the mountains.
Landform: Slopes and rolling landforms of the Trans-Pecos mountains.
Soils: Limestone Hill and Mountain and High Montane Conifer Ecological Sites.

Description: High mountain shrublands dominated by the deciduous oak species *Quercus gambelii* (Gambel oak). This species often forms nearly monotypic shrublands, but other species present may include *Cercocarpus montanus* (mountain mahogany), *Robinia neomexicana* (New Mexico locust), *Symphoricarpos oreophilus* (mountain snowberry), and *Rhus trilobata* (skunkbush sumac). These shrubland patches represent southern outliers of the extensive and diverse system further north.

VEGETATION TYPE:

Trans-Pecos: Rocky Mountain Gambel Oak - Mixed Shrubland (12306)

Rocky Mountain Gambel Oak - Mixed Montane Shrubland
Identifier: CES306.818 **MoRAP Code: 12306**
Description: As described for system.

Sparsely Vegetated

Edwards Plateau Cliff
Identifier: CES303.653

Geology: Hard-bedded limestones.
Landform: Vertical or near vertical rock faces, sometimes alternating with slope forming limestone members.
Soils: Little to no soil development. Some soil accumulating on ledges and in crevices.

Description: Some of these sites may be mesic, accumulating moisture from nearby slopes in crevices within the limestone substrate, and seeps may be present. They often occur as long narrow bands. Composition and cover on these cliff faces is a function of aspect, canopy cover provided by surrounding systems, local climate, and moisture available from the underlying geologic formation. Seeps and mesic sites may have fairly dense cover of *Adiantum capillus-veneris* (southern maidenhair-fern) with patches of *Thelypteris ovata* var. *lindheimeri* (Lindheimer's maidenfern) present. More xeric sites often have significant shrub cover, with species such as *Ungnadia speciosa* (Mexican buckeye), *Diospyros texana* (Texas persimmon), *Garrya* spp. (silktassel), and *Philadelphus* spp. (mock-orange). Cliff faces become increasingly xeric further west, often with increasing cover of succulents such as *Dasylirion texanum* (Texas sotol) and *Agave lechuguilla* (lechuguilla). Herbaceous species that may be present include *Salvia roemeriana* (cedar sage), *Penstemon baccharifolius* (baccharisleaf penstemon), *Perityle* spp. (rockdaisy), and ferns in the genera *Asplenium*, *Astrolepis*, *Cheilanthes*, and *Pellaea.* Sparse grasses including *Bouteloua hirsuta* (hairy grama), and *Bouteloua rigidiseta* (Texas grama) may be present. These cliffs often serve as refugia from herbivores.

VEGETATION TYPES:

Edwards Plateau: Wooded Cliff / Bluff (806)

Edwards Plateau Wooded Cliff / Bluff
Identifier: CES303.654 **MoRAP Code:** 806
Description: Occurrences with woody cover.

Edwards Plateau: Barren or Grassy Cliff / Bluff (807)

Edwards Plateau Barren or Grassy Cliff / Bluff
Identifier: CES303.654.0 **MoRAP Code:** 807
Description: This vegetation type generally lacks significant vegetative cover due to the limited potential for soil development on such steep surfaces. These cliffs or bluffs may have development of some lichen and patchy grass clumps in limited areas where soil can remain stable. Sparse shrubs and herbaceous cover (with species suggested in the system description) may be present.

North American Warm Desert Bedrock Cliff and Outcrop
Identifier: CES302.745

Geology: This system is well-developed on massive Cretaceous and Permian limestones, but also occupies igneous and sandstone formations.
Landform: Rock faces with slopes greater than 80%.
Soils: Very little to no soil development.

Description: This sparsely vegetated system occupies steep rock faces of the massive limestones and other substrates of the region. Some of these cliffs may be 100's of feet tall. Vegetation is typically restricted to crevices, although crustose lichens may be well-represented.

VEGETATION TYPE:

Trans-Pecos: Cliff and Outcrop (10100)
North American Warm Desert Bedrock Cliff and Outcrop
Identifier: CES.302.745.1 **MoRAP Code:** 10100
Description: As described for system.

North American Warm Desert Pavement
Identifier: CES302.750

Geology: Often Quaternary alluvium and colluvium.
Landform: Level to gently rolling surfaces.
Soils: Gravelly sites.

Description: Unvegetated to very sparsely vegetated sites on level to gently rolling, gravelly landscapes. These sites are often characterized by harsh, high temperature conditions often leading to the development of gravels coated with "desert varnish." This system may occur on alluvial flats or the level portions of bajada fans at low elevations. *Larrea tridentata* (creosotebush) often occurs as widely scattered shrubs.

VEGETATION TYPE:

Trans-Pecos: Desert Pavement (11800)
North American Warm Desert Pavement
Identifier: CES302.750 **MoRAP Code:** 11800
Description: As described for system.

North American Warm Desert Badland
Identifier: CES302.743

Geology: Shale and mudstones commonly provide parent material
Landform: Rolling topography with some abrupt erosional scarps and gullies.

Soils: Clays, often forming clay hills in hot desert environments.

Description: This system is sparsely vegetated to unvegetated on fine-textured soils where high rates of erosion, high temperatures and evaporation, and low precipitation preclude the development of significant vegetative cover. These sites are highly erosional and occupy rolling landscapes frequently cut by drainages.

VEGETATION TYPE:

Trans-Pecos: Desert Badland (11400)
North American Warm Desert Badland
Identifier: CES302.743 **MoRAP Code:** 11400
Description: As described for system.

North American Warm Desert Volcanic Rockland
Identifier: CES302.754

Geology: Tertiary extrusive igneous formations, including tuff, basalt, and rhyolite.
Landform: Usually talus slopes, but also relatively level rocky and boulder sites.
Soils: Soil is generally lacking or reduced to small pockets within the rock matrix.

Description: Very sparsely vegetated sites (<10% cover) on rocky or boulder strewn slopes and flats where the rock material is volcanic in origin. Scattered individuals of species such as *Larrea tridentata* (creosotebush), *Fouquieria splendens* (ocotillo), *Jatropha dioica* (leatherstem), *Prosopis glandulosa* (honey mesquite), *Yucca torreyi* (Torrey's yucca), and cacti such as *Echinocereus* spp. (hedgehog cacti) and *Opuntia rufida* (blind pricklypear) may be present.

VEGETATION TYPE:

Trans-Pecos: Desert Volcanic Rockland (12100)
North American Warm Desert Volcanic Rockland
Identifier: CES302.754 **MoRAP Code:** 2100
Description: As described for system.

Herbaceous Vegetation

Central Mixedgrass Prairie
Identifier: CES303.659
Geology: Quaternary alluvium and other strata where significant soils develop over underlying formations.
Landform: Gently rolling landforms, often occupying lower landscape positions where deeper soil accumulations have occurred.
Soils: Generally on loams and clay loams, and sandy loams of the High Plains and Edwards Plateau.

Description: Central Mixedgrass Prairie represents the common prairie type in the Rolling Plains and occurs on rich loams of the High Plains. This prairie is typically dominated by species such as *Bouteloua curtipendula* (sideoats grama), *Schizachyrium scoparium* (little bluestem), *Pascopyrum smithii* (western wheatgrass), *Pleuraphis mutica* (tobosa), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Hilaria belangeri* (curly-mesquite), *Bouteloua hirsuta* (hairy grama), *Bouteloua gracilis* (blue grama), *Bouteloua dactyloides* (buffalograss), *Nassella leucotricha* (Texas wintergrass), and *Aristida purpurea* (purple threeawn). Grazing tends to favor shortgrass species such as *Bouteloua dactyloides* (buffalograss) and *Bouteloua gracilis* (blue grama). This system is frequently invaded by *Prosopis glandulosa* (honey mesquite), *Juniperus pinchotii* (redberry juniper), and/or *Ziziphus obtusifolia* (lotebush).

VEGETATION TYPE:

Rolling Plains: Mixedgrass Prairie (307)
Central Mixedgrass Prairie
Identifier: CES303.659.9 **MoRAP Code:** 307
Description: As described for system.

Chihuahuan – Sonoran Desert Bottomland and Swale Grassland
Identifier: CES302.746

Geology: Typically on Quaternary alluvium, but may be local in nature and mapped within various geological formations.
Landform: Generally found on local topographic lows that may be associated with a drainage or may occur as basins or swales.
Soils: Found on tight soils, typically Clay Flat Ecological Sites.

Description: This system is named based on the regions (Chihuahuan and Sonoran Deserts) where it is best developed and occupies significant areas; however it does occur well outside these regions, at least as far north and east as the Rolling Plains of Texas. The system typically occurs in local topographic lows that may be associated with drainages, or may represent swales or basins, and typically receive run-off from the surrounding landscape. Soils are generally

clayey, and in some cases the shrink-swell characteristics of the soil may limit the development of woody species. *Pleuraphis mutica* (tobosa) is generally the clear dominant, though other species such as *Panicum obtusum* (vine mesquite), *Sporobolus airoides* (alkali sacaton), *Bouteloua gracilis* (blue grama), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), and *Pascopyrum smithii* (western wheatgrass) may be present. *Prosopis glandulosa* (honey mesquite) and/or *Flourensia cernua* (tarbush), *Koeberlinia spinosa* (allthorn) may be present. In some cases *Prosopis glandulosa* (honey mesquite) may develop into a significant canopy. The system often occupies the Clay Flat Ecological Site.

VEGETATION TYPES:

Southwest: Mesquite / Tobosa Grassland (406)

Chihuahuan – Sonoran Desert Bottomland and Swale Mesquite Grassland
Identifier: CES302.746.1 **MoRAP Code:** 406
Description: Swales and low basins with tight soils where *Prosopis glandulosa* (honey mesquite) forms a significant canopy over a grassland often dominated by *Pleuraphis mutica* (tobosa).

Southwest: Tobosa Grassland (407)

Chihuahuan – Sonoran Desert Bottomland and Swale Grassland (Tobosa Swales)
Identifier: CES302.746.9 **MoRAP Code:** 407
Description: Grass dominated swales and basins with tight soils. This type is often dominated by *Pleuraphis mutica* (tobosa).

Apacherian-Chihuahuan Semi-Desert Grassland and Steppe
Identifier: CES302.735

Geology: Occurs on various substrates, typically not occupying fine alluvium, but may occur on alluvial outwash slopes. This system may occur on igneous, limestone, and sandstone.
Landform: At lower elevations on mountain slopes and continuing onto lower bajadas.
Soils: Typically on rocky soils derived from limestone, igneous, and sandstone substrates.

Description: This grassland system sometimes occurs in association with Chihuahuan Mixed Desert and Thornscrub and may have shrubs of that system present. The herbaceous layer may be dense, but typically much bare ground or rock is visible. Graminoids dominate the layer with species such as *Bouteloua eriopoda* (black grama), *Bouteloua curtipendula* (sideoats grama), *Muhlenbergia setifolia* (curlyleaf muhly), *Bouteloua ramosa* (chino grama), *Muhlenbergia porteri* (bush muhly), *Bouteloua barbata* (sixweeks grama), *Dasyochloa pulchella* (fluffgrass), *Digitaria californica* (Arizona cottontop), and *Aristida* spp. (threeawns). On some slopes, species such as *Dasylirion leiophyllum* (smooth sotol), *Nolina texana* (Texas sacahuista), *Opuntia engelmannii* (Engelmann pricklypear), *Agave lechuguilla* (lechuguilla), *Yucca torreyi* (Torrey's yucca) and/or *Fouquieria splendens* (ocotillo) may be conspicuous, though scattered elements. *Nolina* spp. (sacahuista) and *Dasylirion* spp. (sotol) may dominate some sites, especially on limestone slopes. If significant areas dominated by shrubs are encountered, these sites are likely mapped as Chihuahuan Mixed Desert and Thornscrub, Chihuahuan Succulent

Desert Scrub, or Chihuahuan Creosotebush Desert Scrub depending on composition. Shrub species that may be encountered in these grasslands include *Larrea tridentata* (creosotebush), *Parthenium incanum* (mariola), *Viguiera stenoloba* (skeleton-leaf golden eye), *Acacia constricta* (whitethorn acacia), *Mimosa aculeaticarpa* var. *biuncifera* (catclaw mimosa), *Condalia ericoides* (javelina bush), and many others.

VEGETATION TYPE:

Trans-Pecos: Hill and Foothill Grassland (10207)

Apacherian-Chihuahuan Semi-Desert Grassland and Steppe
Identifier: CES302.735.1 **MoRAP Code:** 10207
Description: Grasslands as described for system. *Dasylirion leiophyllum* (smooth sotol) and/or *Nolina texana* (Texas sacahuista) may be present but occur as widely scattered individuals.

Chihuahuan Loamy Plains Desert Grassland
Identifier: CES302.061

Geology: Primarily occurs on Quaternary alluvium. Included in this system are also grasslands that occupy other formation at higher elevations of mountain foothills. These grasslands may occupy various sedimentary and igneous substrates.
Landform: Level intermountain basins as well as level to gently rolling landforms on the foothills.
Soils: Loamy soils. The foothill grasslands often occupy Shallow Ecological Sites over Perdiz Conglomerate, but may also occur on gravelly sites.

Description: Currently this system (as considered for Phase 5) includes two somewhat distinct grassland types. These grasslands occupy loams of the intermountain basins, and also represent foothill grasslands that occupy shallow soils at the basin edges. These types are often closely juxtaposed and share graminoid composition but differ in abiotic sites, aspect, and invading shrubs. The loamy grasslands are dominated by species such as *Bouteloua gracilis* (blue grama), *Bouteloua curtipendula* (sideoats grama), *Bouteloua eriopoda* (black grama), *Pleuraphis mutica* (tobosa), *Scleropogon brevifolius* (burrograss), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Bothriochloa barbinodis* (cane bluestem), and *Dasyochloa pulchella* (fluffgrass). These grasslands occur in extensive level plains with deep soils. *Prosopis glandulosa* (honey mesquite) is the common shrub invader. Other shrubs present to dominant as invaders include *Larrea tridentata* (creosotebush), *Flourensia cernua* (tarbush), and *Mimosa aculeaticarpa* var. *biuncifera* (catclaw). The foothill grasslands are of similar composition with respect to grasses, but occupy rolling landscapes at slightly higher elevations and are on shallow soils. *Condalia ericoides* (javelina bush), *Juniperus* spp. (junipers), and *Acacia constricta* (whitethorn acacia) are common invaders.

VEGETATION TYPES:

Trans-Pecos: Loamy Plains Grassland (8807)

Chihuahuan Loamy Plains Desert Grassland
Identifier: CES302.061.1 **MoRAP Code:** 8807
Description: This grassland occupies level, deep loams of intermountain basins and is frequently invaded by *Prosopis glandulosa* (honey mesquite), *Larrea tridentata* (creosotebush), and *Flourensia cernua* (tarbush).

Trans-Pecos: Shallow Plains Grassland (8817)

Chihuahuan Loamy Plains Foothill Desert Grassland
Identifier: CES302.061.2 **MoRAP Code:** 8817
Description: This grassland occupies rolling uplands with shallow soils and is frequently invaded by *Condalia ericoides* (javelina bush), *Juniperus* spp. (junipers), and *Acacia constricta* (whitethorn acacia).

Chihuahuan Gypsophilous Grassland and Steppe
Identifier: CES302.732

Geology: Extensive occurrences associated with the Permian Castile Formation and alluvium within evaporative bolsons. The system also occupies scattered occurrences of exposed gypsite and alluvium of evaporative ponds and swales receiving deposition from eroding gypsiferous formations.
Landform: Rolling uplands with minor erosional scarps as well as level basins and drainages.
Soils: Gyp, gyp hills, vegetated gypsum dunes, gyp upland and gyp (desert grassland) ecoclasses.

Description: Occurrences may be sparsely vegetated, grassy, or shrublands. Also included here are the gypsum dunes. Sites occupied by this system may be rolling and erosional uplands, as well as alluvium of basins and drainages. Gypsophilous species are frequently encountered, including *Sporobolus nealleyi* (gypgrass), *Bouteloua breviseta* (gyp grama), *Tiquilia hispidissima* (rough coldenia), *Nama carnosum* (sand nama), *Sartwellia flaveriae* (threadleaf glowwort), *Gaillardia multiceps* (onion blanket-flower), *Anulocaulis* spp. (ringstems) and *Selinocarpus* spp. (moonpods). Other species that may be encountered include *Atriplex canescens* (four-wing saltbush), *Ephedra torreyana* (Torrey jointfir), *Calylophus hartwegii* (Hartweg evening primrose), *Poliomintha incana* (hoary rosemary-mint), *Yucca torreyi* (Torrey's yucca), *Sporobolus airoides* (alkali sacaton), *Scleropogon brevifolius* (burrograss), *Prosopis glandulosa* (honey mesquite), *Larrea tridentata* (creosotebush), *Condalia ericoides* (javelina bush), and *Sporobolus cryptandrus* (sand dropseed). This system includes the gypsum dunes which range from sparsely vegetated to scattered shrubs with patchy herbaceous cover. In addition to many of the species above, the composition of the dunes includes *Artemisia filifolia* (sand sage), *Psorothamnus scoparius* (broom pea), *Poliomintha incana* (hoary rosemary-mint), *Dalea lanata* (wooly dalea), *Andropogon hallii* (sand bluestem), *Sporobolus giganteus* (giant dropseed), *Dimorphocarpa wislizeni* (spectaclepod), *Tidestromia lanuginosa* (wooly tidestromia), *Krameria lanceolata* (trailing ratany), *Mentzelia* spp. (blazingstar), and *Yucca elata* (soaptree yucca).

VEGETATION TYPES:

Trans-Pecos: Gyp Barrens (10300)

Chihuahuan Gyp Barrens
Identifier: CES302.732.1 **MoRAP Code:** 10300
Description: Sparsely vegetated gyp sites.

Trans-Pecos: Gyp Shrubland (10306)

Chihuahuan Gypsophilous Shrubland
Identifier: CES302.732.2 **MoRAP Code:** 10306
Description: Gyp sites with significant shrub cover with species including *Atriplex canescens* (four-wing saltbush), *Prosopis glandulosa* (honey mesquite), *Larrea tridentata* (creosotebush), *Condalia ericoides* (javelina bush), *Yucca torreyi* (Torrey's yucca), and/or *Ephedra torreyana* (Torrey jointfir).

Trans-Pecos: Gyp Grassland (10307)

Chihuahuan Gypsophilous Grassland
Identifier: CES302.732.3 **MoRAP Code:** 10307
Description: Gyp sites with sparse shrub layer and with herbaceous layer present, including herbaceous species mentioned in the system description.

Trans-Pecos: Gyp Dune (10310)

Chihuahuan Gypsum Dunes
Identifier: CES302.732.4 **MoRAP Code:** 10310
Description: In addition to other species mentioned for the system, the composition of the dunes includes *Artemisia filifolia* (sand sage), *Psorothamnus scoparius* (broom pea), *Poliomintha incana* (hoary rosemary-mint), *Dalea lanata* (wooly dalea), *Andropogon hallii* (sand bluestem), *Sporobolus giganteus* (giant dropseed), *Achnatherum hymenoides* (Indian ricegrass), *Dimorphocarpa wislizeni* (spectaclepod), *Tidestromia lanuginosa* (wooly tidestromia), *Krameria lanceolata* (trailing ratany), *Mentzelia* spp. (blazingstar), and *Yucca elata* (soaptree yucca).

Chihuahuan Sandy Plains Semi-Desert Grassland
Identifier: CES302.736

Geology: Aeolian sand, sometimes as a thin veneer over surrounding formations, such as caliche, and sandstone.
Landform: Often level plains and mesas to gently rolling.
Soils: Sandy, loamy sand, and shallow sandy loam soils.

Description: This grassland or steppe occurs on sandy plains throughout the Trans-Pecos and into the arid southern portions of the High Plains. The herbaceous layer is often dominated by grasses such as *Bouteloua eriopoda* (black grama), *Sporobolus flexuosus* (mesa dropseed),

Sporobolus cryptandrus (sand dropseed), *Muhlenbergia arenicola* (sand muhly), *Sporobolus airoides* (alkali sacaton), *Cenchrus spinifex* (common sandbur), and *Aristida purpurea* (purple threeawn). Species such as *Prosopis glandulosa* (honey mesquite), *Yucca elata* (soaptree yucca), *Yucca campestris* (plains yucca), *Yucca torreyi* (Torrey's yucca), and *Larrea tridentata* (creosotebush) may occur as a scattered woody component. The non-native species *Eragrostis lehmanniana* (Lehmann lovegrass) and *Eragrostis barrelieri* (Mediterranean lovegrass) are frequently found in this system.

VEGETATION TYPES:

Trans-Pecos: Sandy Desert Grassland (10507)
Chihuahuan Sandy Plains Semi-Desert Grassland
Identifier: CES302.736 **MoRAP Code:** 10507
Description: As described for system.

Western Great Plains Sand Prairie
Identifier: CES303.670

Geology: Aeolian sands.
Landform: Rolling dunes and level sandy plains.
Soils: Deep sand, sand hills, and adjacent sandy soils.

Description: This represents far southern outliers of this system which is best developed in Nebraska and South Dakota, and may in fact be a different system. These grasslands occupy deep sands and sandhills and are dominated by species such as *Sporobolus giganteus* (giant dropseed), *Sporobolus cryptandrus* (sand dropseed), *Andropogon hallii* (sand bluestem), *Andropogon gerardii* (big bluestem), *Schizachyrium scoparium* (little bluestem), *Paspalum setaceum* (thin paspalum), *Calamovilfa gigantea* (big sandreed), and *Cenchrus spinifex* (common sandbur). Some woody species may be present, including *Artemisia filifolia* (sand sage) and *Quercus havardii* (Havard's shin oak).

VEGETATION TYPE:

High Plains: Sand Prairie (8007)
Identifier: CES303.670 **MoRAP Code:** 8007
Description: As described for system.

Western Great Plains Shortgrass Prairie
Identifier: CES303.672

Geology: On the Quaternary Blackwater Draw Formation, the Ogallala Formation, and Quaternary caliche and pond deposits.
Landform: Level plain.
Soils: Moderately alkaline deep hardland and hardland sites.

Description: Occurrences within Phase 5 represent some of the southernmost expressions of this system. It occupies the level, loamy, ustic (bordering on aridic) soils of the Llano Estacado. These grasslands are typically dominated by shortgrasses such as *Bouteloua dactyloides* (buffalograss), *Bouteloua gracilis* (blue grama), and *Bouteloua hirsuta* (hairy grama). Other species frequently encountered include *Bouteloua curtipendula* (sideoats grama), *Pascopyrum smithii* (western wheatgrass), *Aristida purpurea* (purple threeawn), *Sporobolus cryptandrus* (sand dropseed), *Hordeum pusillum* (little barley), and *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem). Forbs and woody species that may be encountered include *Artemisia filifolia* (sand sage), *Gutierrezia sarothrae* (broom snakeweed), *Yucca glauca* (narrowleaf yucca), *Ambrosia psilostachya* (western ragweed), *Ratibida columnifera* (Mexican hat), *Psoralidium tenuiflorum* (slimflower scurfpea), and *Cylindropuntia imbricata* (tree cholla).

VEGETATION TYPE:

High Plains: Shortgrass Prairie (2907)
Identifier: CES303.672 **MoRAP Code:** 2907
Description: As described for system.

North American Warm Desert Active and Stabilized Dunes
Identifier: CES302.744

Geology: Quaternary aeolian sand deposits associated with the Hueco Bolson and the Salt Basin.
Landform: Rolling dunes and sandy level plains.
Soils: Sand Hills and Deep Sand Ecological Sites.

Description: This system occupies the deep sands adjacent to the Salt Basin west of the Guadalupe Mountains, and the Hueco Basin along the Rio Grande. These sands are characterized by sparsely vegetated active dunes as well as stabilized dunes colonized by species such as *Sporobolus giganteus* (giant dropseed), *Sporobolus flexuosus* (mesa dropseed), *Sporobolus cryptandrus* (sand dropseed), *Sporobolus contractus* (spike dropseed), *Bouteloua eriopoda* (black grama), *Schizachyrium scoparium* (little bluestem), *Aristida purpurea* (purple threeawn), *Prosopis glandulosa* (honey mesquite), *Psorothamnus scoparius* (broom pea), *Artemisia filifolia* (sand sage), *Yucca elata* (soaptree yucca), *Croton dioicus* (grassland croton), *Dimorphocarpa wislizeni* (spectaclepod), *Helianthus petiolaris* (plains sunflower), *Palafoxia sphacelata* (rayed palafoxia), *Heliotropium convolvulaceum* (bindweed heliotrope), *Eriogonum annuum* (annual wildbuckwheat), *Tripterocalyx carneus* (winged sandpuffs), *Amsonia tomentosa* var. *stenophylla* (wooly bluestar), *Proboscidea althaeifolia* (devilshorn), and *Ipomopsis wrightii* (leafy skyrocket).

VEGETATION TYPE:

Trans-Pecos: Sand Dune (11300)
North American Warm Desert Active Dune

Identifier: CES302.744.1 **MoRAP Code:** 11300
Description: Sparsely vegetated sites on deep sand.

Trans-Pecos: Desert Deep Sand and Dune Grassland (11307)

North American Warm Desert Stabilized Dune
Identifier: CES302.744.2 **MoRAP Code:** 10607
Description: Stabilized dune with primarily herbaceous cover, though some woody species may be present.

Southern Rocky Mountain Montane-Subalpine Grassland (Not Mapped)
Identifier: CES306.824

Geology: Tertiary volcanic formations of the Davis Mountains and Permian limestone of the Guadalupe Mountains.
Landform: Limited in distribution to high elevation side slopes and local level plains.
Soils: Loams of high mountains.

Description: The occurrences of this system in Texas represent southern outliers of this system and are small patches in high elevations of the Guadalupe, Chisos, and Davis Mountains. These occurrences may be dominated by *Festuca arizonica* (Arizona fescue), *Bouteloua gracilis* (blue grama), and *Blepharoneuron tricholepis* (pine dropseed). *Muhlenbergia montana* (mountain muhly), *Koeleria micrantha* (junegrass), *Allium cernuum* (nodding onion), *Silene laciniata* ssp. *greggii* (Gregg's campion), *Commelina dianthifolia* (birdbill dayflower) may be present.

Woody Wetlands and Riparian

Edwards Plateau Riparian
Identifier: CES303.652

Geology: This system usually occupies Quaternary deposits along headwater streams. These may be alluvial or gravel deposits and are often within drainages dominated by limestone or other calcareous substrates on the Edwards Plateau or where substrate is influenced by outwash from the Edwards Plateau.

Landform: Riparian systems occupy small streams, either intermittent or perennial. These sites tend to be in erosional situations, as opposed to broad alluvial depositional sites of the floodplain types.

Soils: By definition, this system is mapped in areas upstream of significant development of bottomland soils on soil types of the surrounding uplands.

Description: Riparian vegetation may be characterized as woodlands, shrublands, or herbaceous vegetation. These erosional sites may be gravelly, cobbly, or rocky, and generally occupy the upper reaches of streams. Woodlands may have *Quercus fusiformis* (plateau live oak), *Celtis laevigata* var. *reticulata* (netleaf hackberry), *Prosopis glandulosa* (honey mesquite), *Juniperus ashei* (Ashe juniper), *Juniperus pinchotii* (redberry juniper), *Salix nigra* (black willow), and/or *Sapindus saponaria* var. *drummondii* (western soapberry). Shrub species that may be encountered in the understory of these woodlands (or, in some cases, may form shrublands lacking a significant overstory canopy) include *Juglans microcarpa* (little walnut), *Chilopsis linearis* (desert willow), *Baccharis* spp. (false-willow), *Salix nigra* (black willow), *Juniperus ashei* (Ashe juniper), *Juniperus pinchotii* (redberry juniper), *Sapindus saponaria* var. *drummondii* (western soapberry), *Sophora secundiflora* (Texas mountain-laurel), *Sideroxylon lanuginosum* (gum bumelia), *Diospyros texana* (Texas persimmon), *Ungnadia speciosa* (Mexican buckeye), *Prosopis glandulosa* (honey mesquite), *Cephalanthus occidentalis* (common buttonbush), and/or *Aloysia gratissima* (whitebrush). Substantial patches of herbaceous cover may be present and often include species such as *Andropogon glomeratus* (bushy bluestem), *Panicum virgatum* (switchgrass), *Cladium mariscus* var. *jamaicense* (sawgrass), *Setaria scheelei* (southwestern bristlegrass), *Nassella leucotricha* (Texas wintergrass), *Eleocharis* spp. (spikerush), *Brickellia* spp. (brickellbush), and/or *Hydrocotyle* spp. (water penny). Frequently, *Cynodon dactylon* (Bermudagrass) and/or *Bothriochloa ischaemum* var. *songarica* (King Ranch bluestem) dominate these grassland sites. *Sorghum halepense* (Johnsongrass) is also a commonly encountered non-native grass. This system includes vegetation along very small streams, reaching upstream to spring heads and runs.

VEGETATION TYPES:

Edwards Plateau: Riparian Barrens (1400)

Edwards Plateau Riparian Sparsely Vegetated
Identifier: CES303.652.0 **MoRAP Code:** 1400

Description: Areas within riparian corridors that may be scoured sufficiently frequently (or recent to the classification of the imagery) to preclude the development of significant vegetative cover. This will include gravel bars, sand bars, mud flats, and bare rock surfaces.

Edwards Plateau: Riparian Ashe Juniper Forest (1401)

Edwards Plateau Riparian Ashe Juniper Forest and Woodland
Identifier: CES303.652.1 **MoRAP Code:** 1401
Description: Forest or woodland on riparian sites dominated by *Juniperus pinchotii* (redberry juniper) or *Juniperus ashei* (Ashe juniper). Otherwise generally fitting the description of forest or woodland occurrences of the system, with some deciduous species and *Quercus fusiformis* (plateau live oak) present in the canopy.

Edwards Plateau: Riparian Live Oak Forest (1402)

Edwards Plateau Riparian Live Oak Forest and Woodland
Identifier: CES303.652.2 **MoRAP Code:** 1402
Description: Forest or woodland on riparian sites dominated by *Quercus fusiformis* (plateau live oak). Otherwise, this vegetation type generally fits the description of forest or woodland occurrences of the system, with some deciduous species and *Juniperus pinchotii* (redberry juniper) or *Juniperus ashei* (Ashe juniper) present in the canopy.

Edwards Plateau: Riparian Hardwood - Ashe Juniper Forest (1403)

Edwards Plateau Riparian Hardwood - Ashe Juniper Forest
Identifier: CES303.652.4 **MoRAP Code:** 1403
Description: Forest or woodland on riparian sites co-dominated by evergreen species (*Juniperus pinchotii* (redberry juniper), *Juniperus ashei* (Ashe juniper) and/or *Quercus fusiformis* (plateau live oak)) and deciduous species as mentioned in the system description.

Edwards Plateau: Riparian Hardwood Forest (1404)

Edwards Plateau Riparian Deciduous Forest and woodland
Identifier: CES303.652.6 **MoRAP Code:** 1404
Description: As described for woodland or forest occurrences of the system, with deciduous species dominating the canopy.

Edwards Plateau: Riparian Ashe Juniper Shrubland (1405)

Edwards Plateau Riparian Ashe Juniper Shrubland
Identifier: CES303.652.7 **MoRAP Code:** 1405
Description: Shrublands on riparian sites dominated by *Juniperus pinchotii* (redberry juniper) or *Juniperus ashei* (Ashe juniper).

Edwards Plateau: Riparian Deciduous Shrubland (1406)

Edwards Plateau Riparian Deciduous Shrubland
Identifier: CES303.652.8 **MoRAP Code:** 1406
Description: Shrublands on riparian sites dominated by one or more of the shrub species mentioned in the system description.

Edwards Plateau: Riparian Herbaceous Vegetation (1407)

Edwards Plateau Riparian Herbaceous Vegetation
Identifier: CES303.652.9 **MoRAP Code:** 1407
Description: Riparian sites dominated by upland herbaceous vegetation as described in the system description.

Edwards Plateau: Riparian Herbaceous Wetland (1417)

Edwards Plateau Riparian Herbaceous Wetland
Identifier: CES303.652.10 **MoRAP Code:** 1417
Description: Wetlands along riparian corridors dominated by species such as *Cladium mariscus* ssp. *jamaicense* (saw-grass), *Eleocharis rostellata* (beaked spikerush), *Eleocharis montevidensis* (sand spikerush), *Fuirena simplex* (western umbrellagrass), *Rhynchospora colorata* (whitetop sedge), and *Schoenoplectus pungens* var. *longispicatus* (American bulrush).

North American Warm Desert Riparian Woodland and Shrubland
Identifier: CES302.753

Geology: This system occupies Quaternary Alluvium as well as nearby Cretaceous limestones through which drainages flow.
Landform: Relatively level floodplains and low landscape positions along drainages. Upper portions of these drainages are often flashy, and many are only infrequently and briefly inundated.
Soils: Loamy Bottomland, Salty Bottomland, and Draw are the most frequent Ecological Sites to be occupied by this system.

Description: This system occurs along drainages and floodplains of the larger rivers and drainages of the Trans-Pecos. In addition to the woodland and shrubland expression of this system, sparsely vegetated areas also commonly occur. Sparsely vegetated sites may be mapped on gravel bars, mud flats, or exposed rock within drainages, but may also have sparse woody or herbaceous vegetation including species such as *Brickellia* sp. (brickellbush), *Chilopsis linearis* (desert willow), *Baccharis* sp., (baccharis), *Prosopis glandulosa* (honey mesquite), and *Salvia farinacea* (mealycup sage). The native streamside vegetation along the large drainages is frequently displaced by extensive areas of *Tamarix* sp. (saltcedar) and/or *Arundo donax* (giant reed). Overstory canopy is often not well-developed but contain species such as *Celtis laevigata* var. *reticulata* (netleaf hackberry), *Salix amygdaloides* (peachleaf willow), *Salix gooddingii* (Southwestern black willow), *Prosopis glandulosa* (honey mesquite), *Populus fremontii* (Arizona cottonwood), *Populus deltoides* var. *wislizeni* (Rio Grande cottonwood), *Fraxinus velutina* (velvet ash), and *Sapindus saponaria* var. *drummondii* (western soapberry). Low woodlands and shrublands with species such as *Salix exigua* (Texas sandbar willow), *Baccharis salicifolia* (seepwillow), *Brickellia laciniata* (splitleaf brickellbush), *Chilopsis linearis* (desert willow), *Juglans microcarpa* (little walnut), *Fallugia paradoxa* (Apache plume), and *Celtis ehrenbergiana* (granjeno) are present and sometimes patchy. Flooding and scouring are the dynamic processes most influential in this system.

VEGETATION TYPES:

Trans-Pecos: Riparian Barren (8700)

North American Warm Desert Riparian Sparsely Vegetated
Identifier: CES302.753.01 **MoRAP Code:** 8700
Description: Sparsely vegetated gravel bars, sand bars, or bare rock with scattered individuals or small areas of *Juglans microcarpa* (little walnut), *Chilopsis linearis* (desert willow), *Baccharis* sp. (baccharis), *Brickellia* sp. (brickellbush), or other species.

Trans-Pecos: Riparian Woodland (8704)

North American Warm Desert Riparian Woodland
Identifier: CES302.753.02 **MoRAP Code:** 8704
Description: Woodlands along drainages where the overstory may be composed of species such as *Salix* spp. (willows), *Populus* spp. (cottonwoods), *Sapindus saponaria* var. *drummondii* (western soapberry), *Celtis laevigata* var. *reticulata* (netleaf hackberry), and/or *Prosopis glandulosa* (honey mesquite). Some occurrences mapped as these woodlands may be dominated by *Tamarix* sp. (saltcedar).

Trans-Pecos: Riparian Shrubland (8706)

North American Warm Desert Riparian Shrubland
Identifier: CES302.753.03 **MoRAP Code:** 8706
Description: Shrublands along drainages with species such as *Baccharis* sp. (baccharis), *Brickellia* sp. (brickellbush), *Salix exigua* (desert willow), and *Chilopsis linearis* (desert willow).

Western Great Plains Floodplain
Identifier: CES303.678

Geology: Quaternary alluvium.
Landform: Broad level floodplains.
Soils: Bottomland soils.

Description: This system is found in the floodplains of large to medium rivers, and is of limited extent in this phase. Woodlands and forests are dominated by a canopy of species including *Populus deltoides* (eastern cottonwood), *Celtis laevigata* var. *reticulata* (netleaf hackberry), *Prosopis glandulosa* (honey mesquite), *Sapindus saponaria* var. *drummondii* (western soapberry), and *Salix nigra* (black willow). Southwestern occurrences of the system may have *Quercus fusiformis* (plateau live oak) in the canopy. *Tamarix* spp. (saltcedars) are common woody invaders in this system. Shrub components of the system include *Baccharis* spp. (baccharis), *Salix* spp. (willows), *Cephalanthus occidentalis* (common buttonbush), *Ziziphus obtusifolia* (lotebush), *Rhus trilobata* (skunkbush sumac), and/or *Prosopis glandulosa* (honey mesquite) as significant components of the canopy. Herbaceous components may resemble tallgrass prairie with species such as *Panicum virgatum* (switchgrass), *Andropogon gerardii* (big bluestem), and *Sorghastrum nutans* (yellow Indiangrass) conspicuous. Other graminoids that may be encountered include *Pleuraphis mutica* (tobosa), *Elymus canadensis* (Canada wildrye),

Panicum obtusum (vine mesquite), *Bouteloua curtipendula* (sideoats grama), *Bouteloua gracilis* (blue grama), *Sporobolus airoides* (alkali sacaton), *Spartina pectinata* (prairie cordgrass), *Pascopyrum smithii* (western wheatgrass), *Sorghum halepense* (Johnsongrass), and *Cynodon dactylon* (Bermudagrass). Shrub cover is usually low and grass cover often high.

VEGETATION TYPES:

High Plains: Floodplain Live Oak Forest (2502)

Western Great Plains Floodplain Live Oak Forest
Identifier: CES303.678.1 **MoRAP Code:** 2502
Description: Floodplain woodland and forest with a significant amount of *Quercus fusiformis* (plateau live oak) in the canopy. This type is restricted to the far western edge of Phase 5.

High Plains: Floodplain Hardwood Forest (2504)

Western Great Plains Floodplain Hardwood Forest
Identifier: CES303.678.2 **MoRAP Code:** 2504
Description: Floodplain woodland and forest with an overstory canopy dominated by *Populus deltoides* (eastern cottonwood), *Celtis laevigata* var. *reticulata* (netleaf hackberry), *Salix nigra* (black willow), *Sapindus saponaria* var. *drummondii* (western soapberry), and/or *Prosopis glandulosa.*

High Plains: Floodplain Herbaceous Vegetation (2507)

Western Great Plains Floodplain Herbaceous Vegetation
Identifier: CES303.678.3 **MoRAP Code:** 2507
Description: Floodplains lacking significant woody cover, often dominated by tallgrass species.

Western Great Plains Riparian

Identifier: CES302.738

Geology: Various strata through which minor drainages have developed including aeolian sand, Ogallala Formation, and Quaternary alluvium and fluviatile tile deposits.
Landform: Small streams.
Soils: Various soil types through which minor drainages have developed.

Description: This system represents the vegetation associated with small rivers and streams. It differs from the Western Great Plains Floodplain in that this system occupies smaller streams that tend to be more flashy, may be intermittent, and have less developed floodplains. The woodlands tend to be narrow bands of *Populus deltoides* (eastern cottonwood), *Salix nigra* (black willow), *Celtis laevigata* var. *reticulata* (netleaf hackberry), and/or *Prosopis glandulosa* (honey mesquite). Woody vegetation may also be dominated by *Tamarix* spp. (saltcedars) and/or *Elaeagnus angustifolia* (Russian olive). Herbaceous components of this system are predominantly graminoid including *Bouteloua curtipendula* (sideoats grama), *Bouteloua gracilis*

(blue grama), *Panicum virgatum* (switchgrass), *Pascopyrum smithii* (western wheatgrass), *Panicum obtusum* (vine mesquite), *Pleuraphis mutica* (tobosa), *Cynodon dactylon* (Bermudagrass), and *Sorghum halepense* (Johnsongrass).

VEGETATION TYPES:

High Plains: Riparian Barrens (2700)

Western Great Plains Riparian Barrens
Identifier: CES302.738.1 **MoRAP Code:** 2700
Description: Sparsely vegetated mud, sand, or gravel bars or exposed rock along drainage corridors.

High Plains: Riparian Hardwood Forest (2704)

Western Great Plains Riparian Hardwood Forest
Identifier: CES302.738.2 **MoRAP Code:** 2704
Description: Woodlands and forests dominated by *Populus deltoides* (eastern cottonwood), *Salix nigra* (black willow), *Celtis laevigata* var. *reticulata* (netleaf hackberry), and/or *Prosopis glandulosa* (honey mesquite). Some areas mapped as this type may be dominated by *Tamarix* spp. (saltcedars) or *Elaeagnus angustifolia* (Russian olive).

High Plains: Riparian Herbaceous Vegetation (2707)

Western Great Plains Riparian Herbaceous Vegetation
Identifier: CES302.738.3 **MoRAP Code:** 2707
Description: Grasslands along riparian corridors.

North American Warm Desert Wash
Identifier: CES302.755

Geology: Small drainages through various substrates.
Landform: Small drainages.
Soils: Various soil types transected by small drainages.

Description: This system occurs on flashy, intermittently flooded, often dry washes and arroyos on lower mountain slopes, plains, and basins. These drainages are often embedded within a matrix of desert shrublands and/or grasslands. Washes may be sparsely vegetated, rocky, gravelly, or sandy drainageways, to patchy shrublands to almost continuous shrublands along the drainages. Woody species found in and adjacent to these washes include *Acacia greggii* (catclaw), *Brickellia laciniata* (splitleaf brickellbush), *Baccharis salicifolia* (seepwillow), *Chilopsis linearis* (desert willow), *Fallugia paradoxa* (Apache plume), *Rhus microphylla* (littleleaf sumac), *Juglans microcarpa* (little walnut), *Fraxinus greggii* (little-leaf ash), *Leucaena retusa* (littleleaf leadtree), *Dasylirion leiophyllum* (smooth sotol), and *Prosopis glandulosa* (honey mesquite). Scattered individuals of *Celtis laevigata* var. *reticulata* (netleaf hackberry), *Chilopsis linearis* (desert willow), *Salix gooddingii* (southwestern black willow), *Juglans microcarpa* (little walnut), or other species may form a very sparse overstory. Shrubs from the

surrounding upland shrubland, such as *Larrea tridentata* (creosotebush), *Viguiera stenoloba* (skeleton-leaf golden eye), *Flourensia cernua* (tarbush) and *Juniperus pinchotii* (redberry juniper) may be commonly encountered.

VEGETATION TYPES:

Trans-Pecos: Desert Wash Barren (8600)

North American Warm Desert Wash Barren
Identifier: CES302.755.1 **MoRAP Code:** 8600
Description: Sparsely vegetated sandy, gravelly, rocky stretches of desert drainages.

Trans-Pecos: Desert Wash Evergreen Shrubland (8605)

North American Warm Desert Wash Evergreen Shrubland
Identifier: CES302.755.2 **MoRAP Code:** 8605
Description: Desert drainages with evergreen shrub cover, with species such as *Juniperus pinchotii* (redberry juniper).

Trans-Pecos: Desert Wash Shrubland (8606)

North American Warm Desert Wash Shrubland
Identifier: CES302.755.3 **MoRAP Code:** 8606
Description: Shrub dominated desert drainages sometimes with a sporadic emergent overstory of scattered trees.

Trans-Pecos: Desert Wash Grassland (8607)

North American Warm Desert Wash Grassland
Identifier: CES302.755.4 **MoRAP Code:** 8607
Description: Grass dominated desert drainages, though grass cover is typically not continuous and gravel, rock, or sand is usually visible. Species present may include *Bouteloua curtipendula* (sideoats grama), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Sporobolus airoides* (alkali sacaton), *Muhlenbergia porteri* (bush muhly), *Muhlenbergia rigens* (deergrass), *Pleuraphis mutica* (tobosa), and/or *Bouteloua eriopoda* (black grama).

North American Warm Desert Lower Montane Riparian Woodland
Identifier: CES302.748

Geology: Various geological formations associated with the mountains of the Trans-Pecos, including limestones, sandstones, igneous formations, and alluvial and colluvial deposits.
Landform: Drainages on lower mountain slopes.
Soils: Various soils and sometimes rocky sites lacking any soil development.

Description: This system occupies valleys, drainages, and canyons of lower mountain slopes and foothills. These linear woodlands follow perennial and seasonally intermittent streams and may occur as woodlands or shrublands. Woody species that may be dominant include *Populus fremontii* (Arizona cottonwood), *Populus deltoides* ssp. *wislizeni* (Rio Grande cottonwood),

Juglans major (Arizona walnut), *Fraxinus velutina* (velvet ash), *Salix gooddingii* (southwestern black willow), *Juglans microcarpa* (little walnut), *Sapindus saponaria* var. *drummondii* (western soapberry), *Ungnadia speciosa* (Mexican buckeye), and *Celtis laevigata* var. *reticulata* (netleaf hackberry). Shrubs may be present in the understory or may form shrublands lacking an overstory canopy or with a sparse emergent canopy. Shrubs commonly encountered include *Baccharis salicifolia* (seepwillow), *Salix gooddingii* (Southwestern black willow), *Fallugia paradoxa* (Apache plume), *Rhus microphylla* (littleleaf sumac), *Cephalanthus occidentalis* (common buttonbush), *Mimosa aculeaticarpa* var. *biuncifera* (catclaw mimosa), *Acacia constricta* (whitethorn acacia), *Brickellia californica* (California brickellbush), *Prosopis glandulosa* (honey mesquite), and *Acacia greggii* (catclaw). Some sites with sparse woody overstory may be dominated by grasses such as *Bouteloua curtipendula* (sideoats grama), *Muhlenbergia porteri* (bush muhly), *Distichlis spicata* (saltgrass), *Muhlenbergia rigens* (deergrass), *Sporobolus airoides* (alkali sacaton), *Pleuraphis mutica* (tobosa), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Bouteloua gracilis* (blue grama), and *Aristida* spp. (threeawns).

VEGETATION TYPES:

Trans-Pecos: Lower Montane Riparian Woodland (11704)

North American Warm Desert Lower Montane Riparian Woodland
Identifier: CES302.748 **MoRAP Code:** 11704
Description: Woodlands dominated by species such as *Populus fremontii* (Arizona cottonwood), *Populus deltoides* ssp. *wislizeni* (Rio Grande cottonwood), *Fraxinus velutina* (velvet ash), *Ungnadia speciosa* (Mexican buckeye), and *Celtis laevigata* var. *reticulata* (netleaf hackberry).

Trans-Pecos: Lower Montane Riparian Shrubland (11706)

North American Warm Desert Lower Montane Riparian Shrubland
Identifier: CES302.748.2 **MoRAP Code:** 11706
Description: Shrublands with species such as *Baccharis salicifolia* (seepwillow), *Fallugia paradoxa* (Apache plume), *Mimosa aculeaticarpa* var. *biuncifera* (catclaw mimosa), *Cephalanthus occidentalis* (common buttonbush), and *Salix* spp. (willows.

Trans-Pecos: Lower Montane Riparian Grassland (11707)

North American Warm Desert Lower Montane Riparian Grassland
Identifier: CES302.748.3 **MoRAP Code:** 11707
Description: Sites along drainages of lower mountain slopes lacking significant woody cover.

Madrean Mesic and Canyon Forest and Woodland

Identifier: Not Yet Described

Geology: Various geological strata of the Trans-Pecos mountains, particularly limestone and igneous formations. The system often occupies local alluvium, both fine and coarse, and sometimes Quaternary alluvium as mapped.

Landform: Montane canyons and stream terraces.
Soils: Canyon (Mountain Savannah), Foothill Slope, Draw, Limestone Canyon, Mountain Loam, Limestone Hill & Mountain and Igneous Hill & Mountain Ecological Sites.

Description: Formerly, this previously undescribed system had components that may have been included in the Madrean Lower Montane Pine-Oak Forest and Woodland, Madrean Upper Montane Conifer-Oak Forest and Woodland, North American Desert Lower Montane Riparian Woodland and Shrubland, or Rocky Mountain Bigtooth Maple Ravine Woodland. These woodlands occur in canyons and along streams, sometimes occupying benches, terraces, and adjacent lower slopes with coarse, rocky substrate. The canopy may be variously dominated by a number of coniferous, broad-leaved evergreen, and deciduous components depending on phytogeography, elevation, and availability of groundwater. Canopy species may include *Pseudotsuga menziesii* (Douglas-fir, lacking in the Davis Mountains), *Pinus ponderosa* var. *scopulorum* (ponderosa pine), *Pinus arizonica* var. *stormiae* (Arizona pine, in the Chisos Mountains), *Pinus cembroides* (Mexican pinyon pine), *Pinus edulis* (pinyon pine, in the Guadalupe Mountains), *Cupressus arizonica* (Arizona cypress), *Juniperus deppeana* (alligator juniper), *Juniperus flaccida* (weeping juniper, in the Chisos Mountains), *Quercus emoryi* (Emory oak), *Quercus rugosa* (netleaf oak), *Quercus hypoleucoides* (silverleaf oak), *Quercus graciliformis* (Chisos oak), *Quercus gravesii* (Chisos red oak), *Quercus muehlenbergii* (chinkapin oak), and *Quercus grisea* (gray oak). Species such as *Ungnadia speciosa* (Mexican buckeye), *Acer grandidentatum* (bigtooth maple), *Fraxinus velutina* (velvet ash), *Prunus serotina* var. *virens* (southwestern chokecherry), *Arbutus xalapensis* (Texas madrone), *Ostrya knowltonii* (western hop-hornbeam, in the Guadalupe Mountains), and/or *Ostrya virginiana* var. *chisosensis* (Big Bend hop-hornbeam, in the Chisos Mountains) may be present in more mesic situations, such as perennial water sources. Shrubs that may be present include *Salvia regla* (mountain sage), *Juglans microcarpa* (little walnut), *Nolina erumpens* (foothill nolina), *Dasylirion leiophyllum* (smooth sotol), *Agave havardiana* (Havard agave), *Agave parryi* ssp. *neomexicana* (New Mexico agave), *Mahonia haematocarpa* (red barberry), *Garrya ovata* (eggleaf silktassel), *Ceanothus greggii* (desert Ceanothus), *Crataegus tracyi* (mountain hawthorn), *Cercocarpus montanus* (mountain mahogany), *Sambucus nigra* ssp. *cerulea* (blue elderberry), *Frangula betulifolia* (birchleaf buckthorn), *Philadelphus* spp. (mockorange), and *Vitis arizonica* (canyon grape). The herbaceous layer is patchy with species such as *Piptochaetium fimbriatum* (pinyon ricegrass), *Bouteloua curtipendula* (sideoats grama), *Poa strictiramea* (Chisos bluegrass), *Muhlenbergia rigida* (purple muhly), *Muhlenbergia emersleyi* (bull muhly), *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), and *Schizachyrium scoparium* (little bluestem).

VEGETATION TYPES:

Trans-Pecos: Montane Mesic and Canyon Pine - Juniper Forest (11201)

Madrean Mesic and Canyon Coniferous Forest
Identifier: Not Yet Described **MoRAP Code:** 11201
Description: Canyon and mesic slope woodlands dominated by coniferous evergreen species of *Pinus* spp. (pines), *Juniperus* spp. (junipers), *Pseudotsuga menziesii* (Douglas-fir), and/or *Cupressus arizonica* (Arizona cypress).

Trans-Pecos: Montane Mesic and Canyon Hardwood – Pine - Juniper Forest (11203)

Madrean Mesic and Canyon Mixed Evergreen and Deciduous Forest
Identifier: Not Yet Described **MoRAP Code:** 11203
Description: Woodlands co-dominated by coniferous evergreen species and broad-leaved evergreen and deciduous hardwoods including *Quercus* sp. (oaks), *Acer grandidentatum* (bigtooth maple), and possibly other species.

Trans-Pecos: Montane Mesic and Canyon Hardwood Forest (11204)

Madrean Mesic and Canyon Hardwood Forest
Identifier: Not Yet Described **MoRAP Code:** 11204
Description: Forests and woodlands dominated by deciduous hardwoods such as *Acer grandidentatum* (bigtooth maple), *Quercus muehlenbergii* (chinkapin oak), *Quercus gravesii* (Chisos red oak), and *Fraxinus velutina* (velvet ash). Coniferous evergreen and broad-leaved evergreen are often present in the canopy.

Trans-Pecos: Montane Mesic and Canyon Evergreen Shrubland (11205)

Madrean Mesic and Canyon Evergreen Shrubland
Identifier: Not Yet Described **MoRAP Code:** 11205
Description: Shrublands often mixed within a woodland or forest matrix and dominated by coniferous evergreen and/or broad-leaved evergreen species, often species represented in the canopy of the evergreen forest and woodland.

Trans-Pecos: Montane Mesic and Canyon Shrubland (11206)

Madrean Mesic and Canyon Deciduous Shrubland
Identifier: Not Yet Described **MoRAP Code:** 11206
Description: Shrublands often mixed within a woodland or forest matrix and dominated by deciduous shrub and small tree species.

North American Warm Desert Riparian Mesquite Bosque (Not Mapped)
Identifier: CES302.752

Geology: Quaternary alluvium.
Landform: Floodplain.
Soils: Bottomland

Description: Though occurrences of this system have been reported in the Trans-Pecos, none were mapped. The system is reported to occur, or to have historically occurred along the Rio Grande and is/was dominated by *Prosopis glandulosa* (honey mesquite) forming a woodland canopy. Modification of the flood cycle and introduction of *Tamarix* spp. (saltcedars) may have influenced the distribution of this system on the Rio Grande.

Herbaceous Wetlands

Edwards Plateau Upland Depression
Identifier: CES303.654

Geology: Massive Cretaceous limestones, such as Edwards Limestone.
Landform: Internally draining depressions of karstic origin on level plateau surfaces.
Soils: Loams and clay loams, often mapped as Lakebed or Clay Flat ecoclass.

Description: This system includes shallow wetlands formed over limestone on the Edwards Plateau of Texas. Variable in size and duration of inundation, occurrences of this system are typically found on level uplands and are somewhat circular in configuration. Dominant vegetation includes both graminoids and forbs tolerant of wet periods but not necessarily wetland-dependent. Dominant species may include *Pleuraphis mutica* (tobosa), *Bouteloua dactyloides* (buffalograss), *Tridens albescens* (white tridens), *Sedum nuttallianum* (yellow stonecrop), *Ambrosia psilostachya* (western ragweed), *Paronychia* spp. (whitlow-wort), and the alga *Nostoc commune* (blue-green algae). *Panicum obtusum* (vine mesquite), *Bothriochloa barbinodis* (cane bluestem), *Pascopyrum smithii* (western wheatgrass), *Bouteloua gracilis* (blue grama), *Chenopodium berlandieri* (pitseed goosefoot), *Helianthus ciliaris* (blue-weed), and *Solanum elaeagnifolium* (silverleaf nightshade) may also be present. Some larger occurrences of this wetland system are found in Crockett, Reagan, Schleicher, Irion and Sterling counties in the northwest Edwards Plateau (the Eldorado Plateau). Formation of these occurrences is apparently from solution of the underlying limestone.

VEGETATION TYPE:

Edwards Plateau: Playa (1507)
Edwards Plateau Upland Depression
Identifier: CES303.654.9 **MoRAP Code:** 1507
Description: As described for system.

Western Great Plains Closed Depression Wetland
Identifier: CES303.666

Description: As mapped, this system represents the playas of the southern Great Plains. They are shallow, small (averaging about 6 ha), generally circular, recharge basins receiving moisture from rainfall within internally draining watersheds and lacking significant overland drainage from the basins. They are usually characterized as occupying vertisols with a clay layer of reduced permeability, and are variably wet and dry depending on local weather conditions. Moisture accumulation occurs through overland flow of rainfall falling on the surrounding, internally draining watershed, and drying results from evaporation, transpiration, and infiltration, with playas representing a significant recharge feature of the Ogallala Aquifer. In the current landscape, additional inputs of water, sediment, and nutrients result from crop irrigation if the

context lies within an agricultural matrix. This system is typically dominated by herbaceous vegetation including species such as *Pascopyrum smithii* (western wheatgrass), *Bouteloua dactyloides* (buffalograss), *Eleocharis macrostachya* (pale spikerush), *Helianthus ciliaris* (blue-weed), *Phyla cuneifolia* (wedgeleaf frog-fruit), *Oenothera canescens* (beakpod evening primrose), *Chenopodium berlandieri* (pitseed goosefoot), *Ambrosia grayi* (woollyleaf burr ragweed), *Polygonum pensylvanicum* (Pennsylvania smartweed), *Echinochloa crus-galli* (barnyardgrass), *Bassia scoparia* (kochia), *Malvella leprosa* (alkali mallow), *Rorippa sinuata* (spreading yellowcress), and *Symphyotrichum divaricatum* (southern annual saltmarsh aster). Species such as *Bouteloua dactyloides* and *Pascopyrum smithii* may occupy drier portions of a playa, or may occupy entire playas when those playas have lacked inundation for extended periods. Wetter portions of the basin may have wetland species such as *Typha domingensis* (southern cattail), *Schoenoplectus* spp. (bulrushes), *Eleocharis* spp. (spikerushes), *Sagittaria longiloba* (longlobe arrowhead), *Marsilea vestita* (hooked pepperwort), *Polygonum* spp. (smartweeds), and *Heteranthera limosa* (blue mudplantain), Species richness can vary considerably among individual examples of this system and is especially influenced by hydroperiod and adjacent land use, which is often agriculture. Dynamic processes that affect these depressions are hydrological changes, grazing, and conversion to agricultural use. This system differs from Western Great Plains Open Freshwater Depression Wetland in that the hydrology of these open wetlands is influenced by associated drainages.

VEGETATION TYPES:

High Plains: Playa Lake (6900)

Western Great Plains Closed Depression Lake
Identifier: CES303.666.1 **MoRAP Code:** 6900
Description: Open water and barren areas associated with playa lakes.

High Plains: Playa Grassland (6907)

Western Great Plains Closed Depression Grassland
Identifier: CES303.666.2 **MoRAP Code:** 6907
Description: Grasslands typically dominated by *Bouteloua dactyloides* (buffalograss) and/or *Pascopyrum smithii* (western wheatgrass). Other herbaceous species are typically present as described for the system.

High Plains: Playa Marsh (6908)

Western Great Plains Closed Depression Wetland
Identifier: CES303.666.2 **MoRAP Code:** 6908
Description: Areas within the playa that retain moisture sufficient to support wetland plants including some obligate wetland species. Commonly encountered species include *Typha domingensis* (southern cattail), *Sagittaria longiloba* (longlobe arrowhead), *Polygonum* spp. (smartweeds), *Eleocharis* spp. (spikerushes), and *Schoenoplectus* spp. (bulrushes).

North American Warm Desert Playa
Identifier: CES302.751

Geology: Quaternary alluvial, playa, and caliche deposits.
Landform: Internally draining, somewhat circular basins.
Soils: Verhalen clay.

Description: This system forms in alternately wet and dry, internally draining, often clay-lined basins, sometimes over caliche. They tend to be sparsely vegetated, sometimes with open water, or herbaceous vegetation. High evaporation rates leads to high salinity and halophytic species may be common. Species that may be present include *Distichlis spicata* (saltgrass), *Allenrolfea occidentalis* (pickle-weed), *Tiquilia canescens* (oreja de pero), *Suaeda* ssp. (seablite), *Salsola* ssp. (Russian thistle), and *Atriplex canescens* (four-wing saltbush).

VEGETATION TYPES:

Trans-Pecos: Desert Playa Lake and Barrens (11900)

North American Warm Desert Playa
Identifier: CES302.751.1 **MoRAP Code:** 11900
Description: Sites as described for the system that are sparsely vegetated or are open water when precipitation events occur.

Trans-Pecos: Desert Playa Grassland (11907)

North American Warm Desert Playa Grassland
Identifier: CES302.751.2 **MoRAP Code:** 11907
Description: Sites as described for system with vegetative cover as described for system.

Western Great Plains Open Freshwater Depression Wetland
Identifier: CES303.675

Geology: Usually Quaternary alluvium.
Landform: Lakes and stream margins.
Soils: Various soils including bottomland, loams, draws, and sandy.

Description: This system occurs in basins and margins of lakes, rivers, and streams and differs from the Western Great Plains Closed Depression Wetland in that it is associated with a permanent or semipermanent body of water, either by association with a stream network, a large watershed area, or a direct connection to the groundwater table. Occurrences of the system are variable and may form wetland complexes with submergent or floating vegetation, emergent vegetation, or wet prairies, depending on depth and duration of flooding. Such marshes associated with floodplains and streams should be included with the Western Great Plains Floodplain or Western Great Plains Riparian systems where appropriate. The species found in this system may include *Potamogeton* spp. (pondweeds), *Marsilea vestita* (hooked pepperwort), *Sagittaria longiloba* (longlobe arrowhead), *Ceratophyllum demersum* (coontail), *Stuckenia pectinata* (sago pondweed), *Typha* spp. (cattails), *Schoenoplectus* spp. (bulrushes), *Polygonum* spp. (smartweeds), *Carex* spp. (sedges), *Eleocharis* spp. (spikerushes), *Echinochloa crus-galli*

(barnyardgrass), *Phyla nodiflora* (common frog-fruit), and *Phalaris caroliniana* (Carolina canarygrass).

VEGETATION TYPE:

High Plains: Depressional Marsh (3808)

Western Great Plains Open Freshwater Depression Wetland
Identifier: CES303.675 **MoRAP Code:** 3808
Description: As described for system.

Western Great Plains Saline Depression Wetland
Identifier: CES303.669

Geology: Sometimes associated with the Tahoka Formation or the Ogallala Formation, but may occur over other substrates including Quaternary alluvium.
Landform: Somewhat circular basins, or sometimes forming linear bands adjacent to drainages.
Soils: High Lime, Salty Bottomland, and Wet Saline Ecological Sites.

Description: Saline lakes and salty bottomlands often with salt encrusted surfaces and sometimes sparsely vegetated. Some of these lakes were thought to form from wind deflation and/or dissolution of subsurface strata and some have associated springs, with evaporation causing concentration of salts at the surface. Dominant species of the sites are often halophytic, or at least salt tolerant, including *Sporobolus airoides* (alkali sacaton), *Distichlis spicata* (saltgrass), *Hordeum jubatum* (foxtail barley), *Schoenoplectus* spp. (bulrushes), *Suaeda suffrutescens* (desert seepweed), *Allenrolfea occidentalis* (pickle-weed), *Bassia scoparia* (kochia), *Atriplex canescens* (four-wing saltbush), and *Prosopis glandulosa* (honey mesquite). During periods of high rainfall and as one moves further from the salt encrusted surfaces into surrounding habitats, species composition becomes less dominated by halophytes with species such as *Bothriochloa laguroides* ssp. *torreyana* (silver bluestem), *Sporobolus cryptandrus* (sand dropseed), *Aristida purpurea* (purple threeawn), and *Ziziphus obtusifolia* (lotebush). *Tamarix* spp. (saltcedar) may be present to dominant.

VEGETATION TYPES:

High Plains: Salt Lake (3900)

Western Great Plains Saline Lake
Identifier: CES303.669.1 **MoRAP Code:** 3900
Description: Margins and center of salt lakes, either sparsely vegetated or open water.

High Plains: Salt Lake Shrubland (3906)

Western Great Plains Saline Depression Shrubland
Identifier: CES303.669.2 **MoRAP Code:** 3906
Description: Shrublands surrounding salt lakes, often dominated by *Atriplex canescens* (four-wing saltbush) or *Tamarix* spp. (saltcedar). *Prosopis glandulosa* (honey mesquite) is also commonly encountered.

High Plains: Alkali Sacaton Grassland (3907)

Western Great Plains Saline Depression Alkali Sacaton Grassland
Identifier: CES303.669.3 **MoRAP Code:** 3907
Description: Grasslands surrounding salt lakes typically dominated by *Sporobolus airoides* (alkali sacaton), but with other species as mentioned in system description.

High Plains: Salt Marsh (3908)

Western Great Plains Saline Depression Marsh
Identifier: CES303.669.4 **MoRAP Code:** 3908
Description: The wettest vegetated portion of the salt lake where marsh has developed with species such as *Schoenoplectus* spp. (bulrushes) abundant.

North American Warm Desert Cienega

Identifier: CES302.747

Geology: While the cienegas themselves often occur within Quaternary alluvium, the springs that feed the marshes and moist-soil habitats emanate from contacts often of Cretaceous limestone with less permeable formations.
Landform: Spring runs and draws fed by freshwater springs.
Soils: Often associated with Draw (Desert Grassland) Ecological Sites.

Description: This predominately herbaceous system occurs on drainages fed by freshwater springs. Evaporative processes may create saline conditions leading to the presence and/or dominance of species such as *Sporobolus airoides* (alkali sacaton), *Distichlis spicata* (saltgrass), *Sesuvium verrucosum* (winged sea purslane), and *Trianthema portulacastrum* (desert horse purslane), and *Limonium limbatum* (bordered sea-lavender). Other moist-soil species include *Schoenoplectus pungens* var. *longispicatus* (American bulrush), *Juncus* spp. (rushes), and *Eleocharis* spp. (spikerushes). Composition of the occurrence is dependent on the depth and availability of water associated with the originating spring. At some sites, rare species such as *Helianthus paradoxus* (Pecos sunflower), *Nesaea longipes* (longstalk heimia), and *Agalinis calycina* (Leoncita false foxglove) may be found. The non-native grass *Cynodon dactylon* (Bermudagrass) is often encountered.

VEGETATION TYPES:

Trans-Pecos: Desert Cienega Shrubland (11506)

North American Warm Desert Cienega Shrubland
Identifier: CES302.747.1 **MoRAP Code:** 11506
Description: Though this system is typically herbaceous, some occurrences may become dominated by species such as *Atriplex canescens* (four-wing saltbush) or *Prosopis glandulosa* (honey mesquite).

Trans-Pecos: Desert Cienega Marsh (11517)

North American Warm Desert Cienega Marsh
Identifier: CES302.747.2 **MoRAP Code:** 11517

Description: Occurrences dominated by herbaceous species as described for the system.

North American Arid West Emergent Marsh
Identifier: CES300.729

Geology: Various substrates, but often Quaternary alluvium.
Landform: Depressions, margins of freshwater lakes, and margins of streams and rivers.
Soils: Various edaphic situations, with accumulation of organic material depending on the length of time the marsh has been established.

Description: Vegetation occupying depressions, margins of lakes, or margins of streams that are frequently or continuously inundated by freshwater. This system includes marshes occupying stock tanks and other man-made depressions, and other moist to wet sites other than marshes. The vegetation is dominated by herbaceous species including *Schoenoplectus pungens* var. *longispicatus* (American bulrush), *Schoenoplectus acutus* (hardstem bulrush), *Cladium mariscus* ssp. *jamaicense* (saw-grass), *Eleocharis montevidensis* (sand spikerush), *Polypogon monspeliensis* (rabbitfoot grass), *Echinochloa crus-galli* (barnyardgrass), *Cynodon dactylon* (Bermudagrass), *Phragmites australis* (common reed), *Phalaris caroliniana* (Carolina canarygrass), *Typha domingensis* (southern cattail), *Juncus* spp. (rushes), *Potamogeton* spp. (pondweeds), *Polygonum* spp. (smartweeds), *Ceratophyllum demersum* (coontail), and *Chara* spp. (stoneworts).

VEGETATION TYPE:

Trans-Pecos: Marsh (8908)
North American Arid West Emergent Marsh
Identifier: CES300.729 **MoRAP Code:** 8908
Description: As described for system.

Agricultural and Other Human-related Mapped Types

Row Crops (9307)
MoRAP Code: 9307
Description: This type includes all cropland where fields are fallow for some portion of the year. Some fields may rotate into and out of cultivation frequently, and year-round cover crops are generally mapped as grassland.

Orchard (9304)
MoRAP Code: 9304
Description: Primarily pecan orchards.

Conservation Reserve Program / Other Improved Grassland (9327)
MoRAP Code: 9327
Description: Grasslands that are managed under the Conservation Reserve Program and other grasslands and pastures.

Urban High Intensity (9410)
MoRAP Code: 9410
Description: This type consists of built-up areas and wide transportation corridors that are dominated by impervious cover.

Urban Low Intensity (9411)
MoRAP Code: 9411
Description: This type includes areas that are built-up but not entirely covered by impervious cover, and includes most of the non-industrial areas within cities and towns.

Mainly Natural Azonal Mapped Types

Barren (9000)
MoRAP Code: 9000
Description: This type includes areas where little or no vegetative cover existed at the time of image data collection. Large areas cleared for development are included, as well as rural roads and buildings and associated clearing in primarily rural areas. Stream beds with exposed gravel or bedrock, rock outcrops, quarries, and mines may be mapped as this type. Fallow fields or areas within cropland blocks that remain barren throughout one growing season or heavily grazed pastures where bare soils are dominant may also be mapped as barren.

Native Invasive: Juniper Woodland (9101)
MoRAP Code: 9101

Description: *Juniperus* spp. (junipers), including *Juniperus ashei* (Ashe juniper), *Juniperus pinchotii* (redberry juniper), *Juniperus deppeana* (alligator juniper), or *Juniperus monosperma* (one-seeded juniper), dominate these woodlands, typically on sites that would naturally support prairies and grassland.

Native Invasive: Juniper Shrubland (9105)

MoRAP Code: 9105
Description: *Juniperus* spp. (junipers), including *Juniperus ashei* (Ashe juniper), *Juniperus pinchotii* (redberry juniper), *Juniperus deppeana* (alligator juniper), or *Juniperus monosperma* (one-seeded juniper), dominate these shrublands, typically on sites that would naturally support prairies and grassland.

Native Invasive: Mesquite Shrubland (9106)

MoRAP Code: 9106
Description: *Prosopis glandulosa* (honey mesquite) is often the dominant species of this broadly-defined type, but species such as *Ziziphus obtusifolia* (lotebush), *Juniperus* spp. (junipers), and *Atriplex canescens* (four-wing saltbush) may also be important. This type is generally mapped on disturbed soils, loams, playas, and hardland.

Native Invasive: Catclaw Shrubland (9166)

MoRAP Code: 9166
Description: Invasive shrublands often dominated by *Mimosa aculeaticarpa* var. *biuncifera* (catclaw mimosa), *Acacia constricta* (whitethorn acacia), and/or *Parthenium incanum* (mariola).

Native Invasive: Mesquite - Creosotebush Shrubland (9186)

MoRAP Code: 9186
Description: Invasive shrublands dominated by *Prosopis glandulosa* (honey mesquite) and/or *Larrea tridentata* (creosotebush). Other species such as *Flourensia cernua* (tarbush), *Parthenium incanum* (mariola), *Acacia constricta* (whitethorn acacia), and *Atriplex canescens* (four-wing saltbush) are commonly encountered.

Non-native Invasive: Saltcedar Woodland and Shrubland (9204)

MoRAP Code: 9204
Description: These woodlands and shrublands are generally dominated by *Tamarix* spp. (saltcedars), to the exclusion of other species. Species such as *Baccharis* spp. (baccharis) and *Prosopis glandulosa* (honey mesquite) may be present, but usually as scattered individuals.

Non-native Invasive: Giant Reed (9207)

MoRAP Code: 9207
Description: Areas mapped within this type are often dominated by nearly pure stands of *Arundo donax* (giant reed), often along drainages, particularly along the Rio Grande.

Non-native Invasive: Elm - Olive Woodland (9224)

MoRAP Code: 9224
Description: Invasive deciduous woodlands, primarily in the High Plains, typically dominated by *Elaeagnus angustifolia* (Russian olive) and/or *Ulmus pumila* (Siberian elm).

Open Water (9600)

MoRAP Code: 9600

Description: In addition to large lakes and rivers, ephemeral ponds may be mapped as open water. Some mapped areas may support vegetation with pioneering species such as *Salix nigra* (black willow), *Populus deltoides* (eastern cottonwood), *Tamarix* spp. (saltcedar), *Juncus* spp. (rushes), sedges, *Typha* spp. (cattails), and *Eleocharis* spp. (spikerushes).