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## CES200.998 TEMPERATE PACIFIC MONTANE WET MEADOW

Division 200,

**Spatial Scale & Pattern:** Small Patch
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland
**Concept Summary:** Montane wet meadows occur as open wet depressions among montane forests from California's Transverse and Peninsular ranges north to the Alaskan coastal forests at varying elevations depending on latitude. They may have surface water for part of the year, but depths rarely exceed a few centimeters. Soils show typical hydric soil characteristics, including high organic content and/or low chroma and redoximorphic features. This system often occurs as a mosaic of several plant associations with varying dominant herbaceous species that may include *Camassia quamash, Carex bolanderi, Carex utriculata, Carex vesicaria, Dodecatheon jeffreyi, Glyceria striata (= Glyceria elata), Juncus nevadensis, Veratrum californicum*, and *Scirpus* and/or *Schoenoplectus* spp. Wet meadows are tightly associated with snowmelt and typically are not subjected to high disturbance events such as flooding.

### DISTRIBUTION

**Range:** California's Transverse and Peninsular ranges north to the Alaskan coastal forests at varying elevations depending on latitude.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- SENECIO TRIANGULARIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1680)
  Senecio triangularis - Mimulus guttatus Herbaceous Vegetation (CEGL001988)
- SENECIO TRIANGULARIS TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1667)
  Senecio triangularis - Veratrum californicum Herbaceous Vegetation (CEGL001989)
- VERATRUM CALIFORNICUM TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1663)
  Veratrum californicum - Juncus nevadensis Herbaceous Vegetation (CEGL001946)

### SOURCES

**Last updated:** 24 Mar 2003 **Stakeholders:**
**Concept Author:** P. Comer **LeadResp:** WCS

## CES204.100 NORTH PACIFIC MONTANE GRASSLAND

Division 204,

**Spatial Scale & Pattern:** Large Patch
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This system includes open dry meadows and grasslands on the west side of the Cascades Mountains and northern Sierra Nevada. They occur in montane elevations up to 3500 m (10,600 feet). Soils tend to be deeper and more well-drained than the surrounding forest soils. Soils can resemble prairie soils in that the A-horizon is dark brown, relatively high in organic matter, slightly acid, and usually well-drained. Dominant species include *Elymus* spp., *Festuca idahoensis*, and *Nassella cernua*. These large-patch grasslands are intermixed with matrix stands of red fir, lodgepole pine, and dry-mesic mixed conifer forests and woodlands.

### DISTRIBUTION

**Range:** West side of the Cascades Mountains and northern Sierra Nevada, in montane elevations up to 3500 m (10,600 feet).
**Ecological Divisions:**

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**CONCEPT SOURCES**

**Last updated:** 24 Mar 2003 **Stakeholders:**
**Concept Author:** P. Comer, G. Kittel **LeadResp:** WCS

## CES206.899 MEDITERRANEAN CALIFORNIA ALPINE BEDROCK AND SCREE

Division 206,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland
**Concept Summary:** This system occurs in limited alpine environments mostly concentrated in the Sierra Nevada, but also on Mount Shasta and as far south as the Peninsular Ranges and White Mountains. Alpine elevations begin around 3500 m (10,600 feet) in the southern mountain ranges and 2700 m (8200 feet) in the southern Cascades. These are barren and sparsely vegetated alpine substrates, typically including both bedrock outcrops and scree slopes, with nonvascular (lichen)-dominated communities. This also encompasses a limited area of "alpine desert" with unstable sandy substrates and scattered individuals of *Astragalus* spp., *Arabis* spp., *Draba* spp., and *Oxytropis* spp., which mostly fall to the east of the Sierra Nevada crest. Exposure to desiccating winds, rocky and sometimes unstable substrates, and a short growing season limit plant growth.

**DISTRIBUTION**

**Range:** Concentrated in the Sierra Nevada, but also on Mount Shasta and as far south as the Peninsular Ranges and White Mountains. Alpine elevations begin around 3500 m (10,600 feet) in the southern mountain ranges and 2700 m (8200 feet) in the southern Cascades.
**Ecological Divisions:**

**CONCEPT SOURCES**

**Last updated:** 17 Mar 2003 **Stakeholders:**
**Concept Author:** P. Comer, T. Keeler-Wolf **LeadResp:** WCS

## CES206.916 MEDITERRANEAN CALIFORNIA DRY-MESIC MIXED CONIFER FOREST AND WOODLAND

Division 206,

**Spatial Scale & Pattern:** Matrix **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** These mixed-conifer forests occur on all aspects in lower montane zones (600-1800 m in northern California; 1200-2150 m in southern California). *Pseudotsuga menziesii, Calocedrus decurrens, Pinus lambertiana*, and *Quercus kelloggii, Acer macrophyllum* (in mesic pockets) are most frequent, but *Pinus ponderosa, Pinus jeffreyi, Pinus attenuata* may codominate in the Sierra Nevada foothills. *Pseudotsuga macrocarpa* is present in this system in the Transverse Ranges of southern California. Historically, frequent and low-intensity fire maintained these woodlands. This system occurs in a variety of topo-edaphic positions, such as upper slopes at higher elevations, canyon sideslopes, ridgetops, and south- and west-facing slopes which burn relatively frequently. Due to fire suppression, the majority of these forests now have closed canopies, where in the past a moderately high fire frequency (20-30 years) formerly maintained an open forest of many conifers.

**DISTRIBUTION**

**Range:** Lower montane zones (600-1800 m in northern California; 1200-2150 m in southern California).
**Ecological Divisions:**

**CONCEPT SOURCES**

**Last updated:** 17 Mar 2003 **Stakeholders:**
**Concept Author:** P. Comer, T. Keeler-Wolf **LeadResp:** WCS

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## CES206.918 MEDITERRANEAN CALIFORNIA PONDEROSA-JEFFREY PINE FOREST AND WOODLAND

Division 206,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland

**Concept Summary:** These forests are found on warm, xeric sites in foothills and mountains from southern Oregon (600-1830 m [1800-5000 feet]) south throughout the Transverse Ranges and into northern Baja California (1200-2740 m [4000-8300 feet]). While the two dominant pines tend to segregate by soil fertility and temperature regimes, they may co-occur in certain areas (e.g., Modoc Plateau). *Pinus jeffreyi* replaces *Pinus ponderosa* as dominant at higher elevations. Understory species include *Arctostaphylos patula, Ceanothus cordulatus, Ceanothus prostratus, Ceanothus integerrimus, Eriogonum wrightii, Frangula rubra (= Rhamnus rubra), Lupinus elatus*, and *Symphoricarpos rotundifolius var. parishii (= Symphoricarpos parishii)*. Historically, frequent localized ground fires maintained these systems.

### DISTRIBUTION

**Range:** Foothills and mountains from southern Oregon (600-1830 m [1800-5000 feet]) south throughout the Transverse Ranges and into northern Baja California (1200-2740 m [4000-8300 feet]).

**Ecological Divisions:**

### CONCEPT SOURCES

**Last updated:** 17 Mar 2003 **Stakeholders:**

**Concept Author:** P. Comer, T. Keeler-Wolf **LeadResp:** WCS

## CES206.913 MEDITERRANEAN CALIFORNIA RED FIR FOREST AND WOODLAND

Division 206,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland

**Concept Summary:** This system includes high-elevation (1600-2700 m [4850-8200 feet]) forests and woodlands dominated by *Abies magnifica (= var. magnifica), Abies X shastensis (= Abies magnifica var. shastensis), Abies procera*, and *Pinus contorta var. murrayana*. It is typically found on deep, well-drained soils throughout this elevation zone from the central Sierra Nevada north and west into southern Oregon. Heavy snowpack is a major source of soil moisture throughout the growing season. Driving ecological processes are occasional blow-down, insect outbreaks and stand-replacing fire. Common understory species include *Lonicera conjugialis, Quercus vacciniifolia, Ribes viscosissimum*, and *Symphoricarpos rotundifolius*. This system commonly occurs above mixed conifer forests with *Abies concolor* and overlaps in elevation with forests and woodlands of *Pinus contorta var. murrayana*.

### DISTRIBUTION

**Range:** It is typically found on deep, well-drained soils throughout the high-elevation zone (1600-2700 m [4850-8200 feet]) from the central Sierra Nevada north and west into southern Oregon.

**Ecological Divisions:**

### CONCEPT SOURCES

**Last updated:** 17 Mar 2003 **Stakeholders:**

**Concept Author:** P. Comer, T. Keeler-Wolf **LeadResp:** WCS

## CES206.952 MEDITERRANEAN CALIFORNIA SUBALPINE-MONTANE FEN

Division 206,

**Spatial Scale & Pattern:** Small Patch **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

**Concept Summary:** This system is found in montane to subalpine elevations confined to specific environments defined by groundwater discharge, soil chemistry, and peat accumulation. This system includes extreme rich fens which are quite rare. Fens form at low points in the landscape or near slopes where groundwater intercepts the soil surface. Groundwater inflows maintain a fairly constant water level year-round, with water at or near the surface most of the time. Constant high water levels lead to accumulation of organic material. In addition to peat accumulation and perennially saturated soils, the extreme rich fens have distinct soil and water chemistry, with high levels of one or more minerals such as calcium and/or magnesium. They usually occur as a mosaic of several plant associations dominated by species of *Carex, Betula, Kobresia*, or



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*Schoenoplectus*. The surrounding landscape may be ringed with other wetland systems, e.g., riparian shrublands, or a variety of upland systems from grasslands to forests.

**DISTRIBUTION**

**Ecological Divisions:**

**CONCEPT SOURCES**

**Last updated:** 17 Mar 2003 **Stakeholders:**
**Concept Author:** P. Comer, T. Keeler-Wolf **LeadResp:** WCS

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## CES206.911 NORTHERN PACIFIC MESIC SUBALPINE WOODLAND

Division 206,

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This system occurs on ridges and rocky slopes around timberline at 2600 m (7900 feet) in the central Sierra Nevada and 2450 m (8000 feet) in the southern Cascades. These woodlands are found on concave or mesic slopes in areas with long-lasting snowpack and better soil development than other drier and more exposed subalpine woodlands. Characteristic species include *Tsuga mertensiana, Abies magnifica, Abies procera, Pinus albicaulis, Juniperus communis*, and *Penstemon davidsonii*, as well as patches of grasses, sedges, and forbs grading into adjacent meadows.

**DISTRIBUTION**

**Range:** Occurs on ridges and rocky slopes around timberline at 2600 m (7900 feet) in the central Sierra Nevada and 2450 m (8000 feet) in the southern Cascades.
**Ecological Divisions:**

**CONCEPT SOURCES**

**Last updated:** 17 Mar 2003 **Stakeholders:**
**Concept Author:** P. Comer, T. Keeler-Wolf **LeadResp:** WCS

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## CES206.901 SIERRA NEVADA CLIFF AND CANYON

Division 206,

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland
**Concept Summary:** Found from foothill to subalpine elevations throughout the Sierra Nevada and nearby mountain ranges, these are barren and sparsely vegetated areas (<10% plant cover) of steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock. This system also includes unstable scree and talus slopes typically occurring below cliff faces. Scattered vegetation may include *Abies magnifica, Pseudotsuga menziesii, Pinus contorta var. murrayana, Pinus ponderosa, Pinus jeffreyi, Populus tremuloides*, or *Pinus monophylla, Juniperus osteosperma*, and *Cercocarpus ledifolius* at lower elevations. There may be shrubs including species of *Arctostaphylos* or *Ceanothus*. Soil development is limited as is herbaceous cover.

**DISTRIBUTION**

**Range:** Found from foothill to subalpine elevations throughout the Sierra Nevada and nearby mountain ranges.
**Ecological Divisions:**

**CONCEPT SOURCES**

**Last updated:** 17 Mar 2003 **Stakeholders:**
**Concept Author:** P. Comer, T. Keeler-Wolf **LeadResp:** WCS

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## CES206.912 SIERRA NEVADA SUBALPINE LODGEPOLE PINE FOREST AND WOODLAND

Division 206,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland

**Concept Summary:** This system is widespread in glacial basins at upper montane to subalpine elevations of the central and northern Sierra Nevada and Peninsular Ranges where cold-dry conditions exist (1800-2450 m [6000-8000 feet] in the north and 2450-3600 m [8000-12,000 feet] in the south). These forests are dominated by *Pinus contorta var. murrayana* with shrub, grass, or barren understories. Soils are often shallow and coarse-textured. Avalanche, as well as tree mortality from insect outbreak and disease, drought and associated wildfire, are drivers of community structure and composition. Associated plant species include *Arctostaphylos nevadensis, Ceanothus cordulatus, Cercocarpus ledifolius, Chrysolepis sempervirens, Phyllodoce breweri*, and *Ribes montigenum.*

### DISTRIBUTION

**Range:** Glacial basins at upper montane to subalpine elevations of the central and northern Sierra Nevada and Peninsular Ranges where cold-dry conditions exist (1800-2450 m [6000-8000 feet] in the north and 2450-3600 m [8000-12,000 feet] in the south).

**Ecological Divisions:**

### CONCEPT

### SOURCES

**Last updated:** 17 Mar 2003 **Stakeholders:**

**Concept Author:** P. Comer, T. Keeler-Wolf **LeadResp:** WCS

## CES300.729 NORTH AMERICAN ARID WEST EMERGENT MARSH

Division 300, Herbaceous Wetland

**Spatial Scale & Pattern:** Small Patch **Classification Confidence:** high

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

**Diagnostic Classifiers:** Herbaceous, Mineral: W/ A-Horizon >10 cm, Graminoid, Aquatic Herb, Depressional [Lakeshore], Depressional [Pond], Deep (>15 cm) Water, Saturated Soil

**Non-Diagnostic Classifiers:** Montane [Montane], Montane [Lower Montane], Lowland [Foothill], Lowland [Lowland], Backwater, Drainage bottom (undifferentiated), Floodplain, Marsh, Oxbow, Pond, Temperate [Temperate Continental], Forb, Alga, Clay Subsoil Texture

**Concept Summary:** This widespread ecological system occurs throughout much of the arid and semi-arid regions of western North America. Natural marshes may occur in depressions in the landscape (ponds, kettle ponds), as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes are also referred to as sloughs). Marshes are frequently or continually inundated, with water depths up to 2 m. Water levels may be stable, or may fluctuate 1 m or more over the course of the growing season. Marshes have distinctive soils that are typically mineral, but can also accumulate organic material. Soils have characteristics that result from long periods of anaerobic conditions in the soils (e.g., gleyed soils, high organic content, redoximorphic features). The vegetation is characterized by herbaceous plants that are adapted to saturated soil conditions. Common emergent and floating vegetation includes species of *Scirpus* and/or *Schoenoplectus, Typha, Juncus, Potamogeton, Polygonum, Nuphar*, and *Phalaris*. This system may also include areas of relatively deep water with floating-leaved plants (*Lemna, Potamogeton*, and *Brasenia*) and submergent and floating plants (*Myriophyllum, Ceratophyllum*, and *Elodea*).

### DISTRIBUTION

**Range:** Occurs throughout much of the arid and semi-arid regions of western North America.

**Ecological Divisions:** 301, 302, 303, 304, 305, 306

**TNC Ecoregions:** 11:C, 17:C, 18:C, 19:C, 20:C, 21:C, 23:C, 24:C, 26:C, 27:C, 28:C, 29:C, 30:C, 6:C, 7:C, 8:C, 9:C

**Subnations/Nations:** AB:c, AZ:c, BC:c, CA:c, CO:c, ID:c, MT:c, MXBC:c, MXCH:c, MXSO:c, ND:c, NE:c, NM:c, NV:c, OK:c, OR:c, SD:c, TX:c, UT:c, WA:c, WY:c

### CONCEPT

**Alliances and Associations:**

- (POTAMOGETON DIVERSIFOLIUS, STUCKENIA FILIFORMIS) PERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1763)
  - Potamogeton diversifolius Herbaceous Vegetation (CEGL002007)
  - Stuckenia filiformis Herbaceous Vegetation (CEGL002008)



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- CALAMAGROSTIS CANADENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1400)
  Calamagrostis canadensis Western Herbaceous Vegetation (CEGL001559)
- CAREX (ROSTRATA, UTRICULATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1403)
  Carex utriculata Herbaceous Vegetation (CEGL001562)
- CAREX NEBRASCENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1417)
  Carex nebrascensis Herbaceous Vegetation (CEGL001813)
- CAREX VESICARIA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.2501)
  Carex vesicaria Herbaceous Vegetation (CEGL002661)
- DISTICHLIS SPICATA INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1332)
  Distichlis spicata - (Scirpus nevadensis) Herbaceous Vegetation (CEGL001773)
- ELEOCHARIS (MONTEVIDENSIS, PALUSTRIS, QUINQUEFLORA) SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1371)
  Eleocharis (montevidensis, palustris, quinqueflora) Seasonally Flooded Herbaceous Vegetation [Placeholder] (CEGL003050)
- GLYCERIA BOREALIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1445)
  Glyceria borealis Herbaceous Vegetation (CEGL001569)
- JUNCUS BALTICUS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1374)
  Juncus balticus - Carex rossii Herbaceous Vegetation (CEGL001839)
  Juncus balticus Herbaceous Vegetation (CEGL001838)
- LEMNA SPP. PERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1747)
  Lemna spp. Permanently Flooded Herbaceous Vegetation (CEGL003059)
- MYRIOPHYLLUM SIBIRICUM PERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1761)
  Myriophyllum sibiricum Herbaceous Vegetation (CEGL002000)
- NYMPHAEA ODORATA - NUPHAR SPP. PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE (A.1984)
  Nuphar lutea ssp. polysepala Herbaceous Vegetation (CEGL002001)
- PHALARIS ARUNDINACEA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1381)
  Phalaris arundinacea Western Herbaceous Vegetation (CEGL001474)
- PHRAGMITES AUSTRALIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1431)
  Phragmites australis Western North America Temperate Semi-natural Herbaceous Vegetation (CEGL001475)
- POTAMOGETON FOLIOSUS PERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.2518)
  Potamogeton foliosus Herbaceous Vegetation (CEGL002742)
- POTAMOGETON SPP. - CERATOPHYLLUM SPP. - ELODEA SPP. PERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1754)
  Potamogeton natans Herbaceous Vegetation (CEGL002925)
- RANUNCULUS AQUATILIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1679)
  Ranunculus aquatilis - Callitriche palustris Herbaceous Vegetation (CEGL001984)
- RUPPIA (CIRRHOSA, MARITIMA) PERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1755)
  Ruppia (cirrhosa, maritima) Permanently Flooded Herbaceous Vegetation [Placeholder] (CEGL003119)
- SALICORNIA RUBRA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1818)
  Salicornia rubra Herbaceous Vegetation (CEGL001999)
- SCHOENOPLECTUS ACUTUS - (SCHOENOPLECTUS TABERNAEMONTANI) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1443)
  Schoenoplectus acutus Herbaceous Vegetation (CEGL001840)
  Schoenoplectus tabernaemontani Temperate Herbaceous Vegetation (CEGL002623)
- SCHOENOPLECTUS AMERICANUS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1432)
  Schoenoplectus americanus - Carex spp. Herbaceous Vegetation (CEGL004144)
  Schoenoplectus americanus - Eleocharis palustris Herbaceous Vegetation (CEGL001585)
  Schoenoplectus americanus - Eleocharis spp. Herbaceous Vegetation (CEGL001586)
  Schoenoplectus americanus - Flaveria chlorifolia - (Helianthus paradoxus) Herbaceous Vegetation (CEGL004592)
  Schoenoplectus americanus Western Herbaceous Vegetation (CEGL001841)
- SCHOENOPLECTUS MARITIMUS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1444)
  Schoenoplectus maritimus Herbaceous Vegetation (CEGL001843)
- SCHOENOPLECTUS PUNGENS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1433)
  Schoenoplectus pungens Herbaceous Vegetation (CEGL001587)
- SPARGANIUM ANGUSTIFOLIUM PERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1760)
  Sparganium angustifolium Herbaceous Vegetation (CEGL001990)
- SPARGANIUM EURYCARPUM PERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.2598)
  Sparganium eurycarpum Herbaceous Vegetation (CEGL003323)
- SPARTINA GRACILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1407)
  Spartina gracilis Herbaceous Vegetation (CEGL001588)
- SPARTINA PECTINATA TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1347)
  Spartina pectinata Western Herbaceous Vegetation (CEGL001476)
- TRIGLOCHIN MARITIMA SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1681)
  Triglochin maritima Herbaceous Vegetation (CEGL001995)
- TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCHOENOPLECTUS SPP.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1436)

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Schoenoplectus acutus - Typha latifolia - (Schoenoplectus tabernaemontani) Sandhills Herbaceous Vegetation (CEGL002030)
Typha latifolia Western Herbaceous Vegetation (CEGL002010)

- TYPHA DOMINGENSIS SEASONALLY FLOODED TEMPERATE HERBACEOUS ALLIANCE (A.1392)
  Typha domingensis Western Herbaceous Vegetation (CEGL001845)

### SOURCES

**References:** Brown 1982, Cooper 1986b, Dick-Peddie 1993, Faber-Langendoen et al. 1997, Hansen et al. 1995, Kittel et al. 1994, Neely et al. 2001, Padgett et al. 1989, Rondeau 2001, Szaro 1989, Ungar 1965, Ungar 1972
**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.741 MOGOLLON CHAPARRAL

Division 302, Shrubland

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**Spatial Scale & Pattern:** Matrix **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Diagnostic Classifiers:** Montane [Lower Montane], Lowland [Foothill], Intermediate Disturbance Interval, F-Patch/High Intensity, Evergreen Sclerophyllous Shrub

**Non-Diagnostic Classifiers:** Montane [Montane], Shrubland (Shrub-dominated), Temperate [Temperate Continental], Temperate [Temperate Xeric], Aridic, Xeric, Broad-Leaved Evergreen Shrub

**Concept Summary:** This ecological system occurs across central Arizona (Mogollon Rim), western New Mexico and southern Utah. It often dominants along the mid-elevation transition from the Mojave, Sonoran, and northern Chihuahuan deserts into mountains (1000-2400 m). It occurs on foothills, mountain slopes and canyons below the encinal and *Pinus ponderosa* woodlands. The moderate to dense shrub canopy includes species such as *Quercus turbinella, Quercus toumeyi, Cercocarpus montanus, Canotia holacantha, Ceanothus greggii, Forestiera pubescens (= Forestiera neomexicana), Garrya wrightii, Juniperus deppeana, Purshia stansburiana, Rhus ovata, Rhus trilobata*, and *Arctostaphylos pungens* and *Arctostaphylos pringlei* at higher elevations. Most chaparral species are fire-adapted, resprouting vigorously after burning or producing fire-resistant seeds. Stands occurring within montane woodlands are seral and a result of recent fires.

### DISTRIBUTION

**Range:** Occurs across central Arizona (Mogollon Rim), western New Mexico and southern Utah. It often dominants along the mid-elevation transition from the Mojave, Sonoran, and northern Chihuahuan deserts into mountains (1000-2400 m).
**Ecological Divisions:** 302, 304, 306
**TNC Ecoregions:** 17:C, 19:C, 21:C, 22:C, 23:C, 24:C
**Subnations/Nations:** AZ:c, CA:?, MXSO:?, NM:c, NV:c, UT:c

### CONCEPT

**Alliances and Associations:**

- ARCTOSTAPHYLOS PATULA SHRUBLAND ALLIANCE (A.788)
  Arctostaphylos patula - Quercus gambelii - (Amelanchier utahensis) Shrubland (CEGL002695)
  Arctostaphylos patula Shrubland (CEGL002696)
- ARCTOSTAPHYLOS PUNGENS SHRUBLAND ALLIANCE (A.789)
  Arctostaphylos pungens Shrubland (CEGL000958)
- CERCOCARPUS MONTANUS SHRUBLAND ALLIANCE (A.896)
  Cercocarpus montanus / Garrya flavescens Shrubland (CEGL001088)
  Cercocarpus montanus / Muhlenbergia pauciflora Shrubland (CEGL001089)
- MORTONIA SEMPERVIRENS SHRUBLAND ALLIANCE (A.859)
  Mortonia scabrella / Dasylirion wheeleri Shrubland (CEGL001279)
- PURSHIA (STANSBURIANA, MEXICANA) SHRUBLAND ALLIANCE (A.833)
  Purshia stansburiana - Arctostaphylos patula Shrubland (CEGL002948)
- QUERCUS PUNGENS SHRUBLAND ALLIANCE (A.783)
  Quercus pungens - Cercocarpus montanus Shrubland (CEGL003832)
- QUERCUS TOUMEYI SHRUBLAND ALLIANCE (A.792)
  Quercus toumeyi / Bouteloua curtipendula Shrubland (CEGL000975)
- QUERCUS TURBINELLA SHRUBLAND ALLIANCE (A.793)
  Quercus turbinella - (Amelanchier utahensis) Colluvial Shrubland (CEGL002950)
  Quercus turbinella - Cercocarpus montanus Shrubland (CEGL000979)
  Quercus turbinella - Coleogyne ramosissima Shrubland (CEGL000982)
  Quercus turbinella - Ephedra viridis Shrubland (CEGL000980)
  Quercus turbinella - Garrya flavescens - Arctostaphylos pungens Shrubland (CEGL000977)



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Quercus turbinella - Juniperus osteosperma Shrubland (CEGL000981)
Quercus turbinella / Bouteloua eriopoda Shrubland (CEGL000978)

### SOURCES

**References:** Carmichael et al. 1978, Dick-Peddie 1993, Muldavin et al. 1994a, Muldavin et al. 2000b
**Last updated:** 20 Feb 2003 **Stakeholders:** WCS
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.742 MOJAVE MID-ELEVATION MIXED DESERT SCRUB

Division 302, Shrubland

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** low
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Diagnostic Classifiers:** Lowland [Foothill], Shrubland (Shrub-dominated), Evergreen Sclerophyllous Tree

**Non-Diagnostic Classifiers:** Sideslope, Temperate [Temperate Xeric], Aridic, Xeromorphic Shrub, Succulent Shrub

**Concept Summary:** This ecological system represents the extensive desert scrub in the transition zone above *Larrea tridentata - Ambrosia dumosa* desert scrub and below the lower montane woodlands (700-1800 m elevations) that occurs in the eastern and central Mojave Desert. It is also common on lower piedmont slopes in the transition zone into the southern Great Basin. The vegetation in this ecological systems is quite variable. Codominants and diagnostic species include *Coleogyne ramosissima, Eriogonum fasciculatum, Ephedra nevadensis, Grayia spinosa, Menodora spinescens, Opuntia acanthocarpa, Pleuraphis rigida, Salazaria mexicana, Viguiera parishii, Yucca brevifolia*, or *Yucca schidigera*. Desert grasses, including *Achnatherum hymenoides, Achnatherum speciosum, Muhlenbergia porteri, Pleuraphis jamesii, Pleuraphis rigida*, or *Poa secunda*, may form an herbaceous layer. Scattered *Juniperus osteosperma* or desert scrub species may also be present.

### DISTRIBUTION

**Range:** Eastern and central Mojave Desert and on lower piedmont slopes in the transition zone into the southern Great Basin.
**Ecological Divisions:** 206, 302, 304
**TNC Ecoregions:** 11:C, 12:P, 17:C, 23:P
**Subnations/Nations:** AZ:c, CA:c, NV:c, UT:c

### CONCEPT

**Alliances and Associations:**

- ARTEMISIA TRIDENTATA (SSP. TRIDENTATA, SSP. XERICENSIS) SHRUBLAND ALLIANCE (A.830)
  Artemisia tridentata ssp. tridentata - Grayia spinosa Shrubland (CEGL001004)
- COLEOGYNE RAMOSISSIMA SHRUBLAND ALLIANCE (A.874)
  Coleogyne ramosissima - Eriogonum fasciculatum Shrubland (CEGL001333)
  Coleogyne ramosissima - Purshia stansburiana Shrubland (CEGL002720)
  Coleogyne ramosissima - Thamnosma montana Shrubland (CEGL002718)
  Coleogyne ramosissima Shrubland (CEGL001332)
- EPHEDRA NEVADENSIS SHRUBLAND ALLIANCE (A.857)
  Ephedra nevadensis - Ericameria cooperi Shrubland (CEGL001253)
  Ephedra nevadensis - Eriogonum fasciculatum Shrubland (CEGL001254)
  Ephedra nevadensis / Achnatherum hymenoides Shrubland (CEGL001255)
- EPHEDRA VIRIDIS SHRUBLAND ALLIANCE (A.858)
  Ephedra viridis / Pleuraphis rigida Shrubland (CEGL001257)
- ERICAMERIA PARRYI SHRUBLAND ALLIANCE (A.818)
  Ericameria parryi Shrubland [Provisional] (CEGL003040)
- ERICAMERIA TERETIFOLIA SHRUBLAND ALLIANCE (A.2540)
  Ericameria teretifolia Shrubland [Placeholder] (CEGL002963)
- ERIOGONUM FASCICULATUM SHRUBLAND ALLIANCE (A.868)
  Eriogonum fasciculatum Rock Outcrop Shrubland (CEGL001260)
  Eriogonum fasciculatum Shrubland (CEGL001258)
- GRAYIA SPINOSA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.1045)
  Grayia spinosa - Lycium andersonii Shrubland (CEGL001347)
  Grayia spinosa - Lycium pallidum Shrubland (CEGL001348)
- GRAYIA SPINOSA SHRUBLAND ALLIANCE (A.1038)
  Grayia spinosa - Menodora spinescens Shrubland (CEGL001349)
- JUNIPERUS CALIFORNICA WOODED SHRUBLAND ALLIANCE (A.502)
  Juniperus californica Wooded Shrubland (CEGL003058)



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- MENODORA SPINESCENS DWARF-SHRUBLAND ALLIANCE (A.2515)
  Menodora spinescens Dwarf-shrubland [Placeholder] (CEGL002767)
- NOLINA BIGELOVII SHRUBLAND ALLIANCE (A.2534)
  Nolina bigelovii Shrubland [Placeholder] (CEGL003064)
- NOLINA PARRYI SHRUBLAND ALLIANCE (A.2535)
  Nolina parryi Shrubland [Placeholder] (CEGL002956)
- PEUCEPHYLLUM SCHOTTII SHRUBLAND ALLIANCE (A.2516)
  Peucephyllum schottii Shrubland [Placeholder] (CEGL002722)
- SALAZARIA MEXICANA SHRUBLAND ALLIANCE (A.2538)
  Salazaria mexicana Shrubland [Placeholder] (CEGL002961)
- VIGUIERA PARISHII SHRUBLAND ALLIANCE (A.2526)
  Viguiera parishii Shrubland [Placeholder] (CEGL002721)
- YUCCA BREVIFOLIA WOODED HERBACEOUS ALLIANCE (A.2527)
  Yucca brevifolia / Pleuraphis rigida Wooded Herbaceous Vegetation (CEGL002725)
- YUCCA BREVIFOLIA WOODED SHRUBLAND ALLIANCE (A.884)
  Yucca brevifolia - Juniperus osteosperma / Artemisia tridentata Wooded Shrubland (CEGL002744)
  Yucca brevifolia Wooded Shrubland [Placeholder] (CEGL003116)
- YUCCA SCHIDIGERA SHRUBLAND ALLIANCE (A.881)
  Yucca schidigera Shrubland [Placeholder] (CEGL003117)

- **California community types:**
- California Buckwheat Scrub (32.040.00)
- California Buckwheat - California Figwort - Phacelia (32.040.01)
- California Buckwheat (32.040.02)
- California Buckwheat - Big Sagebrush (32.040.03)
- California Buckwheat Alluvial Fan (32.040.04)
- California Buckwheat-White Bursage (32.040.05)
- California Buckwheat - Bladder Sage (32.040.06)
- Creosote Bush - Nevada Ephedra (33.010.10)
- Creosote Bush - Mojave Yucca - Desert Tea (33.010.11)
- Blackbush High Desert Scrub (33.020.00)
- Sonoran Blackbush (33.020.01)
- Blackbush - Shadscale (33.020.02)
- Blackbush - Nevada Ephedra (33.020.03)
- Blackbush - Nevada Ephedra - California Buckwheat (33.020.04)
- Blackbush - California Buckwheat (33.020.05)
- Blackbush - Creosote Bush - California Buckwheat (33.020.06)
- Blackbush - Creosote Bush - White Bursage (33.020.07)
- Blackbush - Anderson's Wolfberry (33.020.08)
- Blackbush - Bladder Sage (33.020.09)
- Virgin River Encelia Scrub (33.025.00)
- Virgin River Encelia (33.025.01)
- Virgin River Encelia - Blue Sage (33.025.02)
- Creosote Bush - Brittlebush Scrub (33.027.00)
- Creosote Bush - Brittlebush / Arizona Honeysweet (33.027.01)
- Creosote Bush - Brittlebush - Sweetbush (33.027.02)
- Creosote Bush - Brittlebush - White Bursage (33.027.03)
- Creosote Bush - Brittlebush - Ocotillo (33.027.04)
- Brittlebush Drought Deciduous Scrub (33.030.00)
- Brittlebush-succulent scrub (33.030.01)
- Brittlebush-Desert Fir (33.030.02)
- Brittlebush-California Buckwheat-Agave (33.030.03)
- Acton Encelia (33.031.00)
- Desert Sunflower Drought Deciduous Scrub (33.032.00)
- Desert Sunflower-Agave (33.032.01)
- Desert Sunflower-California Buckwheat (33.032.02)
- Net-veined Viguiera Scrub (33.033.00)
- Net-veined Viguiera (33.033.01)
- Mojave Yucca (33.070.01)
- Mojave Yucca - Blackbush (33.070.02)
- Mojave Yucca - Nevada Ephedra (33.070.02)



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- Mojave Yucca - White Bursage (33.070.03)
- Mojave Yucca - Creosote Bush - White Bursage (33.070.05)
- Mojave Yucca - Creosote Bush - Nevada Ephedra (33.070.06)
- Mojave Yucca - California Buckwheat (33.070.07)
- Mojave Yucca - Buckhorn Cholla (33.070.08)
- Mojave Yucca - Desert Sunflower (33.070.09)
- Mojave Yucca - Creosote Bush - (Jojoba) (33.070.10)
- Desert Agave succulent-leaved scrub (33.075.00)
- Desert Agave wash terrace (33.075.01)
- Desert Agave-Mojave Yucca (33.075.02)
- Nolina (33.080.00)
- Parry's Nolina (33.080.01)
- Joshua Tree Woodland (33.170.01)
- Joshua Tree / Blackbush (33.170.02)
- Joshua Tree - California Juniper / Blackbush (33.170.03)
- Joshua Tree / Big Sagebrush - Shadscale (33.170.04)
- Joshua Tree / Creosote Bush - Nevada Ephedra (33.170.05)
- Joshua Tree / Buckhorn Cholla (33.170.06)
- Joshua Tree / Galleta spp. (33.170.07)
- Joshua Tree / Anderson's Wolfberry (33.170.08)
- Joshua Tree / Bladder Sage (33.170.09)
- Joshua Tree / Mojave Yucca - Creosote Bush (33.170.10)
- Joshua Tree / Creosote Bush - White Bursage - California Buckwheat (33.170.11)
- Hop-sage (33.180.01)
- Hop-sage - Shadscale (33.180.02)
- Hop-sage - Creosote Bush (33.180.03)
- Hop-sage - Anderson's Wolfberry (33.180.04)
- Hop-sage - Round-leaved Buckwheat (33.180.05)
- Mojave Mixed Woody Scrub (33.211.00)
- California Ephedra (33.270.00)
- California Ephedra - Cheesebush (33.270.01)
- Nevada Ephedra Scrub (33.280.00)
- Nevada Ephedra (33.280.01)
- Nevada Ephedra - Shadscale (33.280.02)
- Nevada Ephedra - Bladder Sage (33.280.03)
- Nevada Ephedra - Wolfberry (33.280.04)
- Spiny Menodora Scrub (33.290.00)
- Big Sagebrush - Blackbush (35.110.05)
- Big Sagebrush - Virgin River Encelia (35.110.06)
- Big Sagebrush - Green Ephedra (35.110.08)
- Mountain Big Sagebrush / Shorthair Sedge (35.110.10)
- Shadscale - Blackbush (36.320.04)
- Shadscale - Sticky Snakeweed - Catclaw Horsebrush (36.320.05)
- Shadscale - Virgin River Encelia - Hop-sage (36.320.09)

### Spatial Characteristics

**Spatial Summary:** Transition zone shrublands desert scrub above Mojave desert scrub and below the lower montane woodlands.

### Sources

**References:** Barbour and Major 1988, Beatley 1976, Holland and Keil 1995, MacMahon 1988, Ostler et al. 2000, Sawyer and Keeler-Wolf 1995, Thomas et al. 2003a

**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, LACD

**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.756 SONORA-MOJAVE CREOSOTEBUSH-WHITE BURSAGE DESERT SCRUB

Division 302, Shrubland

**Spatial Scale & Pattern:** Matrix **Classification Confidence:** high

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland

**Diagnostic Classifiers:** Lowland [Lowland], Shrubland (Shrub-dominated), Tropical/Subtropical [Tropical Xeric], Temperate [Temperate Xeric], Aridic, Xeromorphic Shrub

**Non-Diagnostic Classifiers:** Toeslope/Valley Bottom, Alkaline Soil, W-Landscape/Medium Intensity

**Concept Summary:** This ecological system forms the vegetation matrix in broad valleys, lower bajadas, plains and low hills in the Mojave and lower Sonoran deserts. This desert scrub is characterized by a sparse to moderately dense layer (2-50% cover) of xeromorphic microphyllous and broad-leaved shrubs. *Larrea tridentata* and *Ambrosia dumosa* are typically dominants, but many different shrubs, dwarf-shrubs, and cacti may codominate or form typically sparse understories. Associated species may include *Atriplex canescens, Atriplex hymenelytra, Encelia farinosa, Ephedra nevadensis, Fouquieria splendens, Lycium andersonii*, and *Opuntia basilaris*. The herbaceous layer is typically sparse, but may be seasonally abundant with ephemerals. Herbaceous species such as *Chamaesyce* spp., *Eriogonum inflatum, Dasyochloa pulchella, Aristida* spp., *Cryptantha* spp., *Nama* spp., and *Phacelia* spp. are common.

### DISTRIBUTION

**Range:** Broad valleys, lower bajadas, plains and low hills in the Mojave and lower Sonoran deserts.
**Ecological Divisions:** 302
**TNC Ecoregions:** 17:C, 23:C
**Subnations/Nations:** AZ:c, CA:c, MXBC:c, MXSO:c, NV:c, UT:c

### CONCEPT

**Alliances and Associations:**

- AMBROSIA DELTOIDEA SHRUBLAND ALLIANCE (A.852)
  Ambrosia deltoidea / Simmondsia chinensis Shrubland (CEGL000953)
- AMBROSIA DUMOSA DWARF-SHRUBLAND ALLIANCE (A.1102)
  Ambrosia dumosa - Ephedra nevadensis Dwarf-shrubland (CEGL000954)
  Ambrosia dumosa - Larrea tridentata var. tridentata Dwarf-shrubland (CEGL000956)
  Ambrosia dumosa / Pleuraphis rigida Dwarf-shrubland (CEGL000955)
- ERIOGONUM FASCICULATUM SHRUBLAND ALLIANCE (A.868)
  Eriogonum fasciculatum - Purshia glandulosa Shrubland (CEGL001259)
  Eriogonum fasciculatum Rock Outcrop Shrubland (CEGL001260)
  Eriogonum fasciculatum Shrubland (CEGL001258)
- GRAYIA SPINOSA - EPHEDRA VIRIDIS SHRUBLAND ALLIANCE (A.1057)
  Grayia spinosa - Ephedra viridis Shrubland (CEGL001346)
- GRAYIA SPINOSA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.1045)
  Grayia spinosa - Lycium andersonii Shrubland (CEGL001347)
  Grayia spinosa - Lycium pallidum Shrubland (CEGL001348)
- GRAYIA SPINOSA SHRUBLAND ALLIANCE (A.1038)
  Grayia spinosa - Menodora spinescens Shrubland (CEGL001349)
  Grayia spinosa - Prunus andersonii Shrubland (CEGL001352)
  Grayia spinosa / Achnatherum hymenoides Shrubland (CEGL001350)
  Grayia spinosa / Achnatherum thurberianum Shrubland (CEGL002681)
  Grayia spinosa / Picrothamnus desertorum Shrubland (CEGL001345)
- LARREA TRIDENTATA - AMBROSIA DUMOSA SHRUBLAND ALLIANCE (A.2532)
  Larrea tridentata - Ambrosia dumosa Shrubland [Placeholder] (CEGL002954)
- LARREA TRIDENTATA - ENCELIA FARINOSA SHRUBLAND ALLIANCE (A.2533)
  Larrea tridentata - Encelia farinosa Shrubland [Placeholder] (CEGL002955)
- LARREA TRIDENTATA SHRUBLAND ALLIANCE (A.851)
  Larrea tridentata - Atriplex confertifolia Shrubland (CEGL001263)
  Larrea tridentata - Atriplex hymenelytra Shrubland (CEGL001264)
  Larrea tridentata - Coleogyne ramosissima Shrubland (CEGL002717)
  Larrea tridentata - Ephedra nevadensis Shrubland (CEGL001268)
  Larrea tridentata - Opuntia basilaris - Fouquieria splendens Shrubland (CEGL001273)
  Larrea tridentata / Lycium andersonii - Grayia spinosa Shrubland (CEGL001271)
  Larrea tridentata / Yucca spp. Shrubland (CEGL001278)
  Larrea tridentata Monotype Shrubland (CEGL001261)

- **California community types:**
- Creosote Bush Scrub (33.010.00)
- Creosote Bush with disturbance (33.010.01)

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- High Diversity Creosote Scrub (33.010.03)
- Creosote Bush - Shockley's Goldenhead (33.010.18)
- White Bursage -Rayless Goldenhead (33.060.01)
- White Bursage (33.060.02)
- White Bursage - Big Galleta (33.060.04)
- White Bursage - California Buckwheat (33.060.05)
- Creosote Bush - White Bursage Scrub (33.140.00)
- Sonoran Creosote Bush Scrub (33.140.04)
- Uniform Creosote Scrub (33.140.05)
- Mojave Creosote Bush Scrub (33.140.06)
- Creosote Bush - White Bursage - Indigo Bush (33.140.07)
- Creosote Bush - White Bursage - California Croton (33.140.08)
- Creosote Bush - White Bursage - Galium - Lyrocarpa (33.140.10)
- Creosote Bush - White Bursage - Mojave Yucca (33.140.11)
- Creosote Bush - White Bursage - Desert Sunflower (33.140.12)
- Creosote Bush - White Bursage - Spiny Senna (33.140.13)
- Creosote Bush - White Bursage - Bladder Sage (33.140.14)
- Creosote Bush - White Bursage - Mojave indigo-bush (33.140.15)
- Creosote Bush - White Bursage - Fremont's indigo-bush (33.140.16)
- Creosote Bush - White Bursage - Big Galleta (33.140.17)
- Creosote Bush - White Bursage - Pencil Cactus (33.140.18)
- Creosote Bush - White Bursage - Anderson's Wolfberry (33.140.19)
- Creosote Bush - White Bursage - Nevada Ephedra (33.140.20)
- Creosote Bush - White Bursage - Desert Peppergrass (33.140.21)
- Creosote Bush - White Bursage - White Ratany (33.140.22)
- Creosote Bush - White Bursage - Pima Ratany (33.140.23)
- Creosote Bush - White Bursage - Thurber's Sandpaper Plant (33.140.24)
- Creosote Bush - White Bursage - Matchweed spp. (33.140.25)
- Creosote Bush - White Bursage - Hop-sage (33.140.26)
- Creosote Bush - White Bursage - Desert Trumpet (33.140.27)
- Creosote Bush - White Bursage - California Buckwheat (33.140.28)
- Creosote Bush - White Bursage - Death Valley Ephedra (33.140.29)
- Creosote Bush - White Bursage - Desert Tea (33.140.30)
- Creosote Bush - White Bursage - Virgin River Encelia (33.140.31)
- Creosote Bush - White Bursage - Brittlebush (33.140.32)
- Creosote Bush - White Bursage - Barrel Cactus (33.140.33)
- Creosote Bush - White Bursage - Downy Dalea (33.140.34)
- Creosote Bush - White Bursage - Cryptogamic crust (33.140.35)
- Creosote Bush - White Bursage - Sweetbush (33.140.36)
- Creosote Bush - White Bursage - Fremont's Chaff-bush (33.140.40)
- Creosote Bush - White Bursage - Fagonia (33.140.41)

**SOURCES**

**References:** Barbour and Major 1988, Brown 1982, Holland and Keil 1995, MacMahon 1988, Thomas et al. 2003a
**Last updated:** 20 Feb 2003 **Stakeholders:** WCS
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.749 SONORA-MOJAVE DESERT MIXED SALT DESERT SCRUB

Division 302, Shrubland

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** low
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Diagnostic Classifiers:** Lowland [Lowland], Shrubland (Shrub-dominated), Basin floor, Toeslope/Valley Bottom, Temperate [Temperate Xeric], Alkaline Soil, Atriplex spp.

**Non-Diagnostic Classifiers:** Tropical/Subtropical [Tropical Xeric], Saline Substrate Chemistry, Aridic

**Concept Summary:** This system includes extensive open-canopied shrublands of typically saline basins in the Mojave and Sonoran deserts. Stands often occur around playas. Substrates are generally fine-textured, saline soils. Vegetation is typically composed of one or more *Atriplex* species such as *Atriplex canescens* or *Atriplex polycarpa* along with other species of



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*Atriplex*. Species of *Allenrolfea, Salicornia, Suaeda*, or other halophytic plants are often present to codominant. Graminoid species may include *Sporobolus airoides* or *Distichlis spicata* at varying densities.

**Comments:** This is a very broad concept. Possibly split Chihuahuan Desert or Baja maritime salt flats out.

### DISTRIBUTION

**Range:** Saline basins in the Mojave and Sonoran deserts.
**Ecological Divisions:** 302
**TNC Ecoregions:** 17:C, 22:C, 23:C
**Subnations/Nations:** AZ:c, CA:c, MXBC:c, MXSO:c, NV:c, UT:c

### CONCEPT

**Alliances and Associations:**

- ATRIPLEX (LENTIFORMIS, POLYCARPA) SHRUBLAND ALLIANCE (A.864)
  Atriplex (lentiformis, polycarpa) Shrubland [Placeholder] (CEGL003016)
- ATRIPLEX CANESCENS SHRUBLAND ALLIANCE (A.869)
  Atriplex canescens - Artemisia tridentata Shrubland (CEGL001282)
  Atriplex canescens - Ephedra viridis Shrubland (CEGL001287)
  Atriplex canescens - Krascheninnikovia lanata Shrubland (CEGL001285)
  Atriplex canescens / Bouteloua gracilis Shrubland (CEGL001283)
  Atriplex canescens / Calycoseris parryi Shrubland (CEGL001284)
  Atriplex canescens / Pleuraphis jamesii Shrubland (CEGL001288)
  Atriplex canescens Shrubland (CEGL001281)
- ATRIPLEX CONFERTIFOLIA SHRUBLAND ALLIANCE (A.870)
  Atriplex confertifolia - Atriplex polycarpa Shrubland (CEGL001299)
  Atriplex confertifolia - Ephedra nevadensis Shrubland (CEGL001303)
  Atriplex confertifolia - Lycium andersonii Shrubland (CEGL001308)
  Atriplex confertifolia - Sarcobatus vermiculatus Shrubland (CEGL001313)
- ATRIPLEX HYMENELYTRA SHRUBLAND ALLIANCE (A.872)
  Atriplex hymenelytra Shrubland (CEGL001317)
- ATRIPLEX POLYCARPA SHRUBLAND ALLIANCE (A.873)
  Atriplex polycarpa Shrubland (CEGL001318)
- ATRIPLEX SPINIFERA SHRUBLAND ALLIANCE (A.865)
  Atriplex spinifera Shrubland [Placeholder] (CEGL003015)
- DISTICHLIS SPICATA INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1332)
  Distichlis spicata Herbaceous Vegetation (CEGL001770)

- **California community types:**
- Saltbush - Creosote Bush (33.010.05)
- Creosote Bush - White Ratany - Big Galleta (33.010.07)
- Creosote Bush / Desert Trumpet (33.010.09)
- Creosote Bush - Allscale (33.010.12)
- Creosote Bush - Desert-holly (33.010.16)
- Creosote Bush - Shadscale (33.010.17)
- White Bursage - Desert-holly (33.060.03)
- Creosote Bush - White Bursage - Desert-holly (33.140.09)
- Creosote Bush - White Bursage - Fourwing Saltbush (33.140.37)
- Creosote Bush - White Bursage - Allscale (33.140.38)
- Creosote Bush - White Bursage - Shadscale (33.140.39)
- Anderson's Wolfberry (33.360.00)
- Anderson's Wolfberry - Jojoba - Big Galleta (33.360.01)
- Desert Saltbush Scrub (36.301.00)
- Valley Saltbush Scrub (36.302.00)
- Interior Coast Range Saltbush Scrub (36.303.00)
- Shadscale - Nevada Ephedra (36.320.02)
- Shadscale - White Bursage (36.320.03)
- Desert-holly (36.330.01)
- Desert-holly - White Bursage (36.330.02)
- Desert-holly - Creosote Bush - White Bursage (36.330.03)
- Desert-holly - Arizona Honeysweet (36.330.04)
- Allscale Scrub (36.340.00)
- Great Valley Allscale Scrub (36.341.00)
- Sierra-Tehachapi Saltbush Scrub (36.342.00)



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- Allscale - Shadscale (36.360.02)
- Quailbush Scrub (36.370.00)
- Big Saltbush - Allscale Scrub (36.370.01)

### SOURCES

**References:** Barbour and Major 1988, Brown 1982, Dick-Peddie 1993, Holland and Keil 1995, MacMahon 1988, Muldavin et al. 2000a, Thomas et al. 2003a

**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS

**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.757 SONORA-MOJAVE-BAJA SEMI-DESERT CHAPARRAL

Division 302, Shrubland

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland

**Diagnostic Classifiers:** Montane [Lower Montane], Lowland [Foothill], Shrubland (Shrub-dominated), Tropical/Subtropical [Tropical Xeric], Temperate [Temperate Xeric], Intermediate Disturbance Interval, F-Patch/High Intensity, Evergreen Sclerophyllous Shrub

**Non-Diagnostic Classifiers:** Ridge/Summit/Upper Slope, Sideslope, Aridic, Broad-Leaved Deciduous Shrub, Broad-Leaved Evergreen Shrub, Short (50-100 yrs) Persistence

**Concept Summary:** This ecological system is composed of evergreen shrublands on sideslopes transitioning from low-elevation desert landscapes up into woodlands of the western Mojave and Sonoran deserts. It extends from northeast Kern County, California, into Baja Norte. Associated species include *Quercus john-tuckeri, Quercus cornelius-mulleri, Quercus berberidifolia, Arctostaphylos patula, Arctostaphylos pungens, Arctostaphylos glauca, Rhus ovata, Cercocarpus montanus var. glaber (= Cercocarpus betuloides), Ceanothus greggii, Garrya flavescens*, and *Nolina parryi*.

### DISTRIBUTION

**Range:** Western Mojave and Sonoran deserts.

**Ecological Divisions:** 302

**TNC Ecoregions:** 17:C, 23:C

**Subnations/Nations:** AZ:c, CA:c, MXBC:c, MXSO:c, NV:c

### CONCEPT

- **California community types:**
- Cupleaf Ceanothus - Fremontia - Oak Chaparral (37.212.00)
- Cupleaf Ceanothus (37.212.01)
- Greenleaf Manzanita Chaparral (37.303.00)
- Greenleaf Manzanita (37.303.01)
- Muller Oak (37.415.00)
- Muller Oak - Brittlebush-Narrowleaf Goldenbush (37.415.02)
- Muller Oak - Mountain Mahogany (37.415.03)
- Tucker Oak Scrub (37.418.00)
- Sugarbush Scrub (37.801.00)
- Shrub Live Oak Scrub (71.095.00)
- Shrub Live Oak - Singleleaf Pinyon (71.095.01)
- Shrub Live Oak - Desert Baccharis (71.095.02)
- California Juniper Woodland and Scrub (89.100.00)
- California Juniper - Desert Agave (89.100.03)
- California Juniper / Blackbush (89.100.04)
- California Juniper - Muller Oak / Blackbush (89.100.05)
- California Juniper / Blackbush - Mojave Yucca (89.100.06)
- California Juniper / Desert Needlegrass (89.100.07)
- California Juniper - Mojave Yucca / Big Galleta (89.100.08)
- California Juniper / California Buckwheat (89.100.10)
- California Juniper / Parry's Nolina (89.100.11)

US EPA ARCHIVE DOCUMENT

### SOURCES

**References:** Barbour and Major 1988, Brown 1982, Holland and Keil 1995, MacMahon 1988, Thomas et al. 2003a
**Last updated:** 20 Feb 2003 **Stakeholders:** WCS
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.748 NORTH AMERICAN WARM DESERT LOWER MONTANE RIPARIAN WOODLAND AND SHRUBLAND

Division 302, Woody Wetland

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**Spatial Scale & Pattern:** Linear **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland
**Diagnostic Classifiers:** Forest and Woodland (Treed), Shrubland (Shrub-dominated), Riverine / Alluvial

**Non-Diagnostic Classifiers:** Lowland [Lowland], Tropical/Subtropical [Tropical Xeric], Temperate [Temperate Xeric], Short (50-100 yrs) Persistence

**Concept Summary:** This ecological system occurs in canyons and valleys of southern Arizona and New Mexico, and adjacent Mexico and consists of mid- to low-elevation (1100-1800 m) riparian corridors along perennial and seasonally intermittent streams. The vegetation is a mix of riparian woodlands and shrublands. Dominant trees include *Populus angustifolia, Populus deltoides ssp. wislizeni, Populus fremontii, Platanus wrightii, Juglans major, Fraxinus velutina*, and *Sapindus saponaria*. Shrub dominants include *Salix exigua, Prunus* spp., *Alnus oblongifolia*, and *Baccharis salicifolia*. Vegetation is dependent upon annual or periodic flooding and associated sediment scour and/or annual rise in the water table for growth and reproduction.

### DISTRIBUTION

**Range:** Southern Arizona and New Mexico, and adjacent Mexico.
**Ecological Divisions:** 302
**TNC Ecoregions:** 17:C, 22:C, 23:C, 24:C
**Subnations/Nations:** AZ:c, CA:c, MXBC:c, MXBS:c, MXCH:c, MXSO:c, NM:c, NV:c, TX:c

### CONCEPT

**Alliances and Associations:**

- ALHAGI MAURORUM SEMI-NATURAL SHRUBLAND ALLIANCE (A.2567)
  Alhagi maurorum Semi-natural Shrubland (CEGL002784)
- BETULA OCCIDENTALIS TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.967)
  Populus fremontii / Betula occidentalis Wooded Shrubland (CEGL002981)
- JUGLANS MAJOR TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.957)
  Juglans major - Pinus edulis / Bromus carinatus Shrubland (CEGL001101)
  Juglans major Shrubland [Provisional] (CEGL001102)
- JUGLANS MICROCARPA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.945)
  Juglans microcarpa / Cladium mariscus ssp. jamaicense Shrubland (CEGL004593)
  Juglans microcarpa / Sorghastrum nutans Shrubland (CEGL004594)
  Juglans microcarpa Shrubland (CEGL001103)
- PLATANUS WRIGHTII TEMPORARILY FLOODED FOREST ALLIANCE (A.309)
  Platanus wrightii - Alnus oblongifolia / Baccharis salicifolia Forest (CEGL002686)
  Platanus wrightii - Fraxinus velutina Forest (CEGL000644)
  Platanus wrightii - Juglans major Forest (CEGL000645)
- PLATANUS WRIGHTII TEMPORARILY FLOODED WOODLAND ALLIANCE (A.643)
  Platanus wrightii Woodland (CEGL000937)
- POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED FOREST ALLIANCE (A.310)
  Populus angustifolia / Rosa woodsii Forest (CEGL000653)
- POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE (A.641)
  Populus angustifolia - Juniperus deppeana / Brickellia californica Woodland (CEGL000933)
  Populus angustifolia / Alnus oblongifolia Woodland (CEGL000938)
  Populus angustifolia / Salix exigua Woodland (CEGL000654)
  Populus angustifolia / Salix irrorata Woodland (CEGL002647)
- POPULUS DELTOIDES SSP. WISLIZENI TEMPORARILY FLOODED FOREST ALLIANCE (A.312)
  Populus deltoides ssp. wislizeni / Baccharis sarothroides Forest (CEGL000663)
- POPULUS DELTOIDES TEMPORARILY FLOODED WOODLAND ALLIANCE (A.636)
  Populus deltoides ssp. wislizeni / Rhus trilobata Woodland (CEGL000940)
- POPULUS FREMONTII SEASONALLY FLOODED WOODLAND ALLIANCE (A.654)
  Populus fremontii / Muhlenbergia rigens Woodland (CEGL001455)
  Populus fremontii / Salix geyeriana Woodland (CEGL000943)



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- POPULUS FREMONTII TEMPORARILY FLOODED FOREST ALLIANCE (A.313)
  Populus fremontii - Platanus wrightii Forest (CEGL000665)
  Populus fremontii - Salix gooddingii / Baccharis salicifolia Forest (CEGL002683)
  Populus fremontii - Salix gooddingii / Salix exigua Forest (CEGL002684)
  Populus fremontii / Acer negundo Forest (CEGL000662)
  Populus fremontii Forest [Placeholder] (CEGL000661)
- POPULUS FREMONTII TEMPORARILY FLOODED WOODLAND ALLIANCE (A.644)
  Populus fremontii - Fraxinus velutina Woodland (CEGL000942)
  Populus fremontii - Salix gooddingii Woodland (CEGL000944)
  Populus fremontii / Baccharis emoryi Woodland [Provisional] (CEGL002946)
  Populus fremontii / Baccharis salicifolia Woodland (CEGL000941)
- RHUS TRILOBATA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.938)
  Rhus trilobata - Prunus serotina Shrubland (CEGL001119)
- ROBINIA NEOMEXICANA SHRUBLAND ALLIANCE (A.924)
  Robinia neomexicana / Thalictrum fendleri Shrubland (CEGL001125)
- SALIX (EXIGUA, INTERIOR) TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.947)
  Salix exigua / Agrostis stolonifera Shrubland (CEGL001199)
  Salix exigua / Elymus X pseudorepens Shrubland (CEGL001198)
- SALIX BONPLANDIANA TEMPORARILY FLOODED FOREST ALLIANCE (A.314)
  Salix bonplandiana Forest (CEGL000679)
- SALIX EXIGUA SEASONALLY FLOODED WOODLAND ALLIANCE (A.649)
  Salix exigua / Baccharis salicifolia - Baccharis neglecta / Schoenoplectus spp. Woodland (CEGL004587)
- SALIX GOODDINGII TEMPORARILY FLOODED WOODLAND ALLIANCE (A.640)
  Salix gooddingii - Fraxinus velutina Temporarily Flooded Woodland (CEGL003729)
  Salix gooddingii Woodland [Provisional] (CEGL002743)
- SALIX IRRORATA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.976)
  Salix irrorata Shrubland (CEGL001214)
- SALIX LAEVIGATA TEMPORARILY FLOODED WOODLAND ALLIANCE (A.646)
  Salix laevigata - Fraxinus velutina Woodland (CEGL000950)
  Salix laevigata Woodland [Provisional] (CEGL002952)
- TAMARIX SPP. SEMI-NATURAL TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.842)
  Tamarix spp. Temporarily Flooded Shrubland (CEGL003114)

### SOURCES

**References:** Brown 1982, Dick-Peddie 1993, Muldavin et al. 2000a, Szaro 1989, Thomas et al. 2003a
**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.752 NORTH AMERICAN WARM DESERT RIPARIAN MESQUITE BOSQUE

Division 302, Woody Wetland

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**Spatial Scale & Pattern:** Linear **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland
**Diagnostic Classifiers:** Lowland [Lowland], Toeslope/Valley Bottom, Tropical/Subtropical [Tropical Xeric], Temperate [Temperate Xeric], Prosopis spp.-dominated, Riverine / Alluvial

**Non-Diagnostic Classifiers:** Forest and Woodland (Treed), Shrubland (Shrub-dominated)

**Concept Summary:** This ecological system consists of low-elevation (<1100 m) riparian corridors along intermittent streams in valleys of southern Arizona and New Mexico, and adjacent Mexico. Dominant trees include *Prosopis glandulosa* and *Prosopis velutina*. Shrub dominants include *Baccharis salicifolia, Pluchea sericea*, and *Salix exigua*. Vegetation, especially the mesquites, tap groundwater below the streambed when surface flows stop. Vegetation is dependent upon annual rise in the water table for growth and reproduction.

### DISTRIBUTION

**Range:** Along intermittent streams in valleys of southern Arizona and New Mexico, and adjacent Mexico.
**Ecological Divisions:** 302
**TNC Ecoregions:** 17:C, 22:C, 23:C, 24:C
**Subnations/Nations:** AZ:c, CA:c, MXBC:p, MXCH:c, MXSO:c, NM:c, NV:c, TX:c

### CONCEPT

**Alliances and Associations:**
- BACCHARIS SALICIFOLIA - BACCHARIS NEGLECTA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.987)
  Baccharis salicifolia - Baccharis neglecta / Eustoma exaltatum Shrubland (CEGL004590)



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- BACCHARIS SALICIFOLIA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.933)
  Baccharis salicifolia / Muhlenbergia rigens Shrubland (CEGL004572)
- BACCHARIS SAROTHROIDES INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.840)
  Baccharis sarothroides - Baccharis salicifolia Shrubland (CEGL001160)
  Baccharis sarothroides - Parkinsonia microphylla Shrubland (CEGL001159)
- BACCHARIS SERGILOIDES INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.2531)
  Baccharis sergiloides Shrubland [Placeholder] (CEGL002953)
- PLEURAPHIS MUTICA SHRUB HERBACEOUS ALLIANCE (A.1551)
  Prosopis glandulosa / Pleuraphis mutica Shrub Herbaceous Vegetation (CEGL001641)
- PLUCHEA SERICEA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.798)
  Pluchea sericea Seasonally Flooded Shrubland [Placeholder] (CEGL003080)
- PROSOPIS (GLANDULOSA, VELUTINA) WOODLAND ALLIANCE (A.661)
  Prosopis (glandulosa var. torreyana, velutina) Woodland [Placeholder] (CEGL003082)
- PROSOPIS GLANDULOSA SHRUB HERBACEOUS ALLIANCE (A.1550)
  Prosopis glandulosa / Bouteloua eriopoda Shrub Herbaceous Vegetation (CEGL001510)
- PROSOPIS GLANDULOSA SHRUBLAND ALLIANCE (A.1031)
  Prosopis glandulosa - Artemisia filifolia / Sporobolus giganteus Shrubland (CEGL002192)
  Prosopis glandulosa - Atriplex spp. Shrubland (CEGL002193)
  Prosopis glandulosa / Atriplex canescens Shrubland (CEGL001382)
  Prosopis glandulosa / Bouteloua curtipendula Shrubland (CEGL002194)
  Prosopis glandulosa / Bouteloua gracilis Shrubland (CEGL001383)
  Prosopis glandulosa / Mixed Grasses Shrubland (CEGL001384)
  Prosopis glandulosa / Muhlenbergia porteri Shrubland (CEGL001511)
  Prosopis glandulosa / Sporobolus airoides Shrubland (CEGL001385)
  Prosopis glandulosa / Sporobolus flexuosus Shrubland (CEGL001386)
  Prosopis glandulosa var. glandulosa / Bouteloua gracilis - Buchloe dactyloides Shrubland (CEGL003877)
  Prosopis glandulosa var. torreyana Shrubland (CEGL001381)
- PROSOPIS GLANDULOSA TEMPORARILY FLOODED WOODLAND ALLIANCE (A.637)
  Prosopis glandulosa Temporarily Flooded Woodland (CEGL004934)
- PROSOPIS GLANDULOSA WOODLAND ALLIANCE (A.611)
  Prosopis glandulosa / Bouteloua curtipendula - Nassella leucotricha Woodland (CEGL002133)
- PROSOPIS PUBESCENS SHRUBLAND ALLIANCE (A.1042)
  Prosopis pubescens Shrubland (CEGL001387)
- PROSOPIS VELUTINA SHRUBLAND ALLIANCE (A.1043)
  Prosopis velutina - Acacia greggii Shrubland (CEGL001388)
  Prosopis velutina / Celtis laevigata var. reticulata Shrubland (CEGL001390)
  Prosopis velutina / Muhlenbergia porteri Shrubland (CEGL001391)

- **California community types:**
- Mesquite Bosque (61.510.05)
- Mesquite Alkaline (61.510.06)
- Mesquite - Willow (61.510.07)
- Upper Desert Mesquite (61.510.08)
- Honey Mesquite Scrub (61.512.00)
- Honey Mesquite (61.512.01)
- Tornillo Scrub (61.513.00)

**SOURCES**

**References:** Barbour and Major 1988, Brown 1982, Dick-Peddie 1993, Muldavin et al. 2000a, Muldavin et al. 2000b, Szaro 1989, Thomas et al. 2003a

**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS

**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.753 NORTH AMERICAN WARM DESERT RIPARIAN WOODLAND AND SHRUBLAND

Division 302, Woody Wetland

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**Spatial Scale & Pattern:** Linear **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

**Diagnostic Classifiers:** Lowland [Lowland], Forest and Woodland (Treed), Shrubland (Shrub-dominated), Tropical/Subtropical [Tropical Xeric], Temperate [Temperate Xeric], Riverine / Alluvial

**Non-Diagnostic Classifiers:** Toeslope/Valley Bottom, Short (50-100 yrs) Persistence



US EPA ARCHIVE DOCUMENT

**Concept Summary:** This ecological system consists of low-elevation (<1200 m) riparian corridors along medium to large perennial streams throughout canyons and the desert valleys of the southwestern United States and adjacent Mexico. The vegetation is a mix of riparian woodlands and shrublands. Dominant trees include *Acer negundo, Fraxinus velutina, Populus fremontii, Salix gooddingii, Salix lasiolepis, Celtis laevigata var. reticulata*, and *Juglans major*. Shrub dominants include *Salix geyeriana, Shepherdia argentea*, and *Salix exigua*. Vegetation is dependent upon annual or periodic flooding and associated sediment scour and/or annual rise in the water table for growth and reproduction.

## DISTRIBUTION

**Range:** Throughout canyons and the desert valleys of the southwestern United States and adjacent Mexico.
**Ecological Divisions:** 302
**TNC Ecoregions:** 17:C, 22:C, 23:C, 24:C, 29:P
**Subnations/Nations:** AZ:c, CA:c, MXBC:c, MXCH:c, MXSO:c, NM:c, NV:c, TX:c

## CONCEPT

**Alliances and Associations:**

- ARUNDO DONAX TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1339)
  Arundo donax Riverbank Herbaceous Vegetation (CEGL004101)
- CELTIS LAEVIGATA VAR. RETICULATA SHRUBLAND ALLIANCE (A.1033)
  Celtis laevigata var. reticulata / Celtis pallida Shrubland (CEGL001163)
- JUGLANS MAJOR TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.957)
  Juglans major - Pinus edulis / Bromus carinatus Shrubland (CEGL001101)
  Juglans major Shrubland [Provisional] (CEGL001102)
- JUGLANS MICROCARPA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.945)
  Celtis laevigata var. reticulata - Juglans microcarpa / Leptochloa dubia Shrubland (CEGL002166)
  Juglans microcarpa / Cladium mariscus ssp. jamaicense Shrubland (CEGL004593)
  Juglans microcarpa / Sorghastrum nutans Shrubland (CEGL004594)
  Juglans microcarpa Shrubland (CEGL001103)
- PLATANUS RACEMOSA TEMPORARILY FLOODED WOODLAND ALLIANCE (A.634)
  Platanus racemosa Temporarily Flooded Woodland [Placeholder] (CEGL003079)
- PLATANUS WRIGHTII TEMPORARILY FLOODED FOREST ALLIANCE (A.309)
  Platanus wrightii - Alnus oblongifolia / Baccharis salicifolia Forest (CEGL002686)
  Platanus wrightii - Fraxinus velutina Forest (CEGL000644)
  Platanus wrightii - Juglans major Forest (CEGL000645)
- PLATANUS WRIGHTII TEMPORARILY FLOODED WOODLAND ALLIANCE (A.643)
  Platanus wrightii Woodland (CEGL000937)
- POPULUS DELTOIDES SSP. WISLIZENI TEMPORARILY FLOODED FOREST ALLIANCE (A.312)
  Populus deltoides / Muhlenbergia asperifolia Forest (CEGL000678)
  Populus deltoides ssp. wislizeni / Baccharis sarothroides Forest (CEGL000663)
- POPULUS DELTOIDES TEMPORARILY FLOODED WOODLAND ALLIANCE (A.636)
  Populus deltoides ssp. wislizeni / Rhus trilobata Woodland (CEGL000940)
- POPULUS FREMONTII SEASONALLY FLOODED WOODLAND ALLIANCE (A.654)
  Populus fremontii / Leymus triticoides Woodland (CEGL002756)
  Populus fremontii / Muhlenbergia rigens Woodland (CEGL001455)
- POPULUS FREMONTII TEMPORARILY FLOODED FOREST ALLIANCE (A.313)
  Populus fremontii - Celtis laevigata var. reticulata / Salvia pinguifolia Forest (CEGL000664)
  Populus fremontii - Platanus wrightii Forest (CEGL000665)
  Populus fremontii - Salix gooddingii / Baccharis salicifolia Forest (CEGL002683)
  Populus fremontii - Salix gooddingii / Salix exigua Forest (CEGL002684)
  Populus fremontii / Acer negundo Forest (CEGL000662)
  Populus fremontii Forest [Placeholder] (CEGL000661)
- POPULUS FREMONTII TEMPORARILY FLOODED WOODLAND ALLIANCE (A.644)
  Populus fremontii - Fraxinus velutina Woodland (CEGL000942)
  Populus fremontii - Salix gooddingii Woodland (CEGL000944)
  Populus fremontii / Baccharis salicifolia Woodland (CEGL000941)
- SALIX (EXIGUA, INTERIOR) TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.947)
  Salix exigua / Agrostis stolonifera Shrubland (CEGL001199)
  Salix exigua / Barren Shrubland (CEGL001200)
- SALIX GOODDINGII TEMPORARILY FLOODED WOODLAND ALLIANCE (A.640)
  Salix gooddingii - Fraxinus velutina Temporarily Flooded Woodland (CEGL003729)
  Salix gooddingii Woodland [Provisional] (CEGL002743)
- TAMARIX SPP. SEMI-NATURAL TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.842)
  Tamarix spp. Temporarily Flooded Shrubland (CEGL003114)

- **California community types:**

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- Sonoran Cottonwood - Willow Riparian (61.130.05)
- Arroyo Willow Riparian Forests and Woodlands (61.201.00)
- Central Coast Arroyo Willow Riparian (61.201.01)
- Southern Arroyo Willow Riparian (61.201.02)
- Arroyo Willow / Blackberry Riparian (61.201.03)
- Arroyo Willow - Shining Willow (61.201.04)
- Black Willow Riparian Forests and Woodlands (61.202.00)
- Red Willow Riparian Forests (61.205.00)
- Red Willow (61.205.01)
- Red Willow / Arroyo Willow (61.205.02)
- Gooding Willow (61.211.01)
- Desert Olive Scrub (61.580.00)
- Desert Olive (61.580.01)
- Oregon Ash Riparian Forest (61.960.00)
- Narrowleaf Willow (63.110.00)
- Narrowleaf Willow - Desert Baccharis (63.110.01)
- Narrow-leaf Willow Riparian Scrub (63.110.02)
- Lemmon's Willow Riparian Scrub (63.113.00)
- Lemmon's Willow (63.113.01)
- Tamarisk Scrubs and Woodlands (63.810.00)
- Shrub Tamarisk (63.810.02)

### SOURCES

**References:** Barbour and Major 1988, Brown 1982, Dick-Peddie 1993, Holland and Keil 1995, Muldavin et al. 2000a, Szaro 1989

**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS

**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.755 NORTH AMERICAN WARM DESERT WASH

Division 302, Woody Wetland

**Spatial Scale & Pattern:** Linear **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland

**Diagnostic Classifiers:** Lowland [Lowland], Shrubland (Shrub-dominated), Toeslope/Valley Bottom, Tropical/Subtropical [Tropical Xeric], Temperate [Temperate Xeric], Riverine / Alluvial, Intermittent Flooding

**Non-Diagnostic Classifiers:** Sideslope, Short (50-100 yrs) Persistence

**Concept Summary:** This ecological system is restricted to intermittently flooded washes or arroyos that dissect bajadas, mesas, plains and basin floors throughout the warm deserts of North America. Although often dry, the intermittent fluvial processes define this system, which are often associated with rapid sheet and gully flow. This system occurs as linear or braided strips within desert scrub- or desert grassland-dominated landscapes. The vegetation of desert washes is quite variable ranging from sparse and patchy to moderately dense and typically occurs along the banks, but may occur within the channel. The woody layer is typically intermittent to open and may be dominated by shrubs and small trees such as *Acacia greggii, Brickellia laciniata, Baccharis sarothroides, Chilopsis linearis, Fallugia paradoxa, Hymenoclea salsola, Hymenoclea monogyra, Juglans microcarpa, Prosopis* spp., *Psorothamnus spinosus, Prunus fasciculata, Rhus microphylla, Salazaria mexicana*, or *Sarcobatus vermiculatus*.

### DISTRIBUTION

**Range:** Restricted to intermittently flooded washes or arroyos that dissect bajadas, mesas, plains and basin floors throughout the warm deserts of North America.

**Ecological Divisions:** 302

**TNC Ecoregions:** 17:C, 22:C, 23:C, 24:C

**Subnations/Nations:** AZ:c, CA:c, MXBC:c, MXCH:c, MXSO:c, NM:c, NV:c, TX:c

### CONCEPT

**Alliances and Associations:**

- (A.0)
  Baccharis emoryi Shrubland [Provisional] (CEGL002974)
- ACACIA GREGGII SHRUBLAND ALLIANCE (A.1036)
  Acacia greggii - Parkinsonia microphylla Shrubland (CEGL001340)



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- BACCHARIS SALICIFOLIA - BACCHARIS NEGLECTA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.987)
  Baccharis salicifolia - Baccharis neglecta / Eustoma exaltatum Shrubland (CEGL004590)
- BACCHARIS SALICIFOLIA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.933)
  Baccharis salicifolia / Muhlenbergia rigens Shrubland (CEGL004572)
- BACCHARIS SAROTHROIDES INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.840)
  Baccharis sarothroides - Baccharis salicifolia Shrubland (CEGL001160)
  Baccharis sarothroides - Parkinsonia microphylla Shrubland (CEGL001159)
- BACCHARIS SERGILOIDES INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.2531)
  Baccharis sergiloides Shrubland [Placeholder] (CEGL002953)
- BRICKELLIA LACINIATA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.940)
  Brickellia laciniata - Hymenoclea monogyra Shrubland (CEGL001953)
- CHILOPSIS LINEARIS INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.1044)
  Chilopsis linearis / Brickellia laciniata Shrubland (CEGL004933)
  Chilopsis linearis Shrubland (CEGL001164)
- ENCELIA VIRGINENSIS SHRUBLAND ALLIANCE (A.860)
  Encelia virginensis Shrubland (CEGL001335)
- EPHEDRA CALIFORNICA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.2536)
  Ephedra californica Shrubland [Placeholder] (CEGL002958)
- ERICAMERIA PANICULATA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.2509)
  Ericameria paniculata Shrubland [Placeholder] (CEGL002706)
- FORESTIERA PUBESCENS TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.969)
  Forestiera pubescens Mojave Desert Shrubland [Provisional] (CEGL002959)
- GRAYIA SPINOSA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.1045)
  Grayia spinosa - Lycium andersonii Shrubland (CEGL001347)
  Grayia spinosa - Lycium pallidum Shrubland (CEGL001348)
- HYMENOCLEA MONOGYRA SHRUBLAND ALLIANCE (A.1034)
  Hymenoclea monogyra Thicket Shrubland (CEGL001169)
- HYMENOCLEA SALSOLA SHRUBLAND ALLIANCE (A.2512)
  Hymenoclea salsola - (Ambrosia eriocentra) Shrubland (CEGL002702)
  Hymenoclea salsola - Salazaria mexicana Shrubland (CEGL002703)
- HYPTIS EMORYI INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.2537)
  Hyptis emoryi Shrubland [Placeholder] (CEGL002960)
- JUGLANS MICROCARPA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.945)
  Juglans microcarpa / Cladium mariscus ssp. jamaicense Shrubland (CEGL004593)
  Juglans microcarpa / Sorghastrum nutans Shrubland (CEGL004594)
  Juglans microcarpa Shrubland (CEGL001103)
- LEPIDOSPARTUM SQUAMATUM INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.838)
  Lepidospartum squamatum Intermittently Flooded Shrubland [Placeholder] (CEGL003060)
- PANICUM BULBOSUM TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1356)
  Panicum bulbosum - Alopecurus aequalis Herbaceous Vegetation (CEGL001653)
  Panicum bulbosum - Lycurus phleoides Herbaceous Vegetation (CEGL001654)
- PROSOPIS (GLANDULOSA, VELUTINA) WOODLAND ALLIANCE (A.661)
  Prosopis (glandulosa var. torreyana, velutina) Woodland [Placeholder] (CEGL003082)
- PROSOPIS GLANDULOSA SHRUB HERBACEOUS ALLIANCE (A.1550)
  Prosopis glandulosa / Bouteloua eriopoda Shrub Herbaceous Vegetation (CEGL001510)
- PROSOPIS GLANDULOSA SHRUBLAND ALLIANCE (A.1031)
  Prosopis glandulosa - Atriplex spp. Shrubland (CEGL002193)
  Prosopis glandulosa / Atriplex canescens Shrubland (CEGL001382)
  Prosopis glandulosa / Bouteloua gracilis Shrubland (CEGL001383)
  Prosopis glandulosa / Mixed Grasses Shrubland (CEGL001384)
  Prosopis glandulosa / Muhlenbergia porteri Shrubland (CEGL001511)
  Prosopis glandulosa / Sporobolus airoides Shrubland (CEGL001385)
  Prosopis glandulosa var. glandulosa / Bouteloua gracilis - Buchloe dactyloides Shrubland (CEGL003877)
  Prosopis glandulosa var. torreyana Shrubland (CEGL001381)
- PROSOPIS GLANDULOSA TEMPORARILY FLOODED WOODLAND ALLIANCE (A.637)
  Prosopis glandulosa Temporarily Flooded Woodland (CEGL004934)
- PROSOPIS GLANDULOSA WOODLAND ALLIANCE (A.611)
  Prosopis glandulosa / Bouteloua curtipendula - Nassella leucotricha Woodland (CEGL002133)
- PROSOPIS PUBESCENS SHRUBLAND ALLIANCE (A.1042)
  Prosopis pubescens Shrubland (CEGL001387)
- PROSOPIS VELUTINA SHRUBLAND ALLIANCE (A.1043)
  Prosopis velutina - Acacia greggii Shrubland (CEGL001388)
- PRUNUS FASCICULATA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.2519)
  Prunus fasciculata Shrubland [Placeholder] (CEGL002704)

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- PSOROTHAMNUS SPINOSUS INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.2520)
  Psorothamnus spinosus Shrubland [Placeholder] (CEGL002701)
- RHUS MICROPHYLLA SHRUBLAND ALLIANCE (A.1040)
  Rhus microphylla / Bouteloua curtipendula Shrubland (CEGL001354)
- SAPINDUS SAPONARIA TEMPORARILY FLOODED FOREST ALLIANCE (A.303)
  Sapindus saponaria - Juglans major Forest (CEGL000557)
- VIGUIERA RETICULATA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.2539)
  Viguiera reticulata Shrubland [Placeholder] (CEGL002962)

- **California community types:**
- Scalebroom Scrub (32.070.00)
- California Buckwheat - Scalebroom (32.070.01)
- Scalebroom - Hairy Yerba Santa - Chaparral Yucca (32.070.02)
- Scalebroom / Mixed Ephemeral Herbs (32.070.03)
- Creosote Bush Wash Scrub (33.010.06)
- Creosote Bush - Cheesebush (33.010.08)
- Creosote Bush - Cheesebush - Woolly Brickellia (33.010.15)
- Catclaw Acacia Thorn Scrub (33.040.00)
- Catclaw Acacia-wash association (33.040.01)
- Catclaw Acacia Savanna (33.040.02)
- Catclaw Acacia / Desert Lavender (33.040.03)
- Catclaw Acacia / Cheesebush (33.040.04)
- Catclaw Acacia - Cheesebush - Virgin River Encelia (33.040.05)
- Catclaw Acacia - Desert Sunflower (33.040.06)
- Catclaw Acacia - Desert Almond (33.040.07)
- Catclaw Acacia - Woolly Bursage (33.040.08)
- Catclaw Acacia - Blue Sage (33.040.09)
- Catclaw Acacia - Sweetbush (33.040.10)
- Catclaw Acacia/Naked buckwheat (33.040.11)
- Desert Lavender Wash Scrub (33.190.00)
- Cheesebush - wash association (33.200.01)
- Cheesebush - California Buckwheat (33.200.02)
- Cheesebush - Blackstem Rabbitbrush (33.200.03)
- Cheesebush - Shadscale (33.200.04)
- Cheesebush - Sweetbush (33.200.05)
- Cheesebush - Woolly Bursage (33.200.06)
- Cheesebush - Woolly Brickellia (33.200.07)
- Cheesebush - Spiny Senna (33.200.08)
- Mojave Wash Scrub (33.213.00)
- Desert Almond Scrub (33.300.00)
- Desert Almond (33.300.01)
- Desert Almond - Bladder Sage (33.300.02)
- Desert Almond - Skunkbrush (33.300.03)
- Desert Almond - Stansbury's Antelope Bush (33.300.04)
- Desert Almond - Woolly Bursage (33.300.05)
- Desert Almond - Net-veined Viguiera - (Utah Mortonia) (33.300.06)
- Bladder Sage (33.310.01)
- Blue Palo Verde - Ironwood - Smoke Tree Woodland (61.530.00)
- Blue Palo Verde Woodland (61.540.00)
- Blue Palo Verde Wash Woodland (61.540.01)
- Blue Palo Verde / Desert Lavender (61.540.02)
- Desert-willow Woodland (61.550.00)
- Desert-willow / Cheesebush (61.550.02)
- Desert-willow - Desert Almond - Cheesebush (61.550.03)
- Desert-willow - Desert Almond (61.550.04)
- Desert-willow - Blue Sage (61.550.05)
- Desert-willow - Desert Sunflower (61.550.06)
- Desert-willow - Blackstem Rabbitbrush (61.550.07)
- Ironwood Woodland (61.560.01)
- Ironwood / Desert Lavender (61.560.02)

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- Smoke Tree Woodland and Scrub (61.570.00)
- Smoketree Wash Woodland (61.570.01)
- Smoketree - Cheesebush - Sweetbush (61.570.02)
- Smoketree / California Ephedra (61.570.03)
- Smoketree - Desert Lavender - Catclaw Acacia (61.570.04)
- Mulefat Scrub (63.510.00)
- Arrow Weed Scrub (63.710.00)
- Sandy to Cobbly wash bottom (99.900.01)

### SOURCES

**References:** Barbour and Major 1988, Brown 1982, Dick-Peddie 1993, MacMahon 1988, Muldavin et al. 2000b, Szaro 1989, Thomas et al. 2003a

**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS

**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.744 NORTH AMERICAN WARM DESERT ACTIVE AND STABILIZED DUNE

Division 302, Barren

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland

**Diagnostic Classifiers:** Dune (Landform), Dune field, Dune (Substrate), Temperate [Temperate Xeric], Sand Soil Texture, W-Landscape/High Intensity

**Non-Diagnostic Classifiers:** Lowland [Lowland], Shrubland (Shrub-dominated), Herbaceous, Dune (undifferentiated), Tropical/Subtropical [Tropical Xeric], Gypsiferous, Aridic

**Concept Summary:** This ecological system occurs across the warm deserts of North America and is composed of unvegetated to sparsely vegetated (generally <10% plant cover) active dunes and sandsheets derived from quartz or gypsum sands. Common vegetation includes *Ambrosia dumosa, Abronia villosa, Eriogonum deserticola, Larrea tridentata, Pleuraphis rigida, Poliomintha* spp., *Prosopis* spp., *Psorothamnus* spp., *Artemisia filifolia*, and *Rhus microphylla*. Dune "blowouts" and subsequent stabilization through succession are characteristic processes.

### DISTRIBUTION

**Range:** Occurs across the warm deserts of North America.

**Ecological Divisions:** 302

**TNC Ecoregions:** 17:C, 22:C, 23:C, 24:C

**Subnations/Nations:** AZ:c, CA:c, MXBC:c, MXBS:c, MXCH:c, MXSO:c, NM:c, NV:c, TX:c

### CONCEPT

**Alliances and Associations:**

- ABRONIA VILLOSA SPARSELY VEGETATED ALLIANCE (A.1852)
  Abronia villosa Sparse Vegetation [Placeholder] (CEGL003001)
- ARTEMISIA FILIFOLIA SHRUBLAND ALLIANCE (A.816)
  Artemisia filifolia - Psorothamnus scoparius - Dalea lanata Gypsum Dune Shrubland (CEGL004561)
  Artemisia filifolia / Andropogon hallii - Achnatherum hymenoides Gypsum Dune Shrubland (CEGL004559)
  Artemisia filifolia / Sporobolus flexuosus Shrubland (CEGL001547)
  Artemisia filifolia / Sporobolus giganteus Shrubland (CEGL001078)
- CLEOME ISOMERIS - EPHEDRA CALIFORNICA - ERICAMERIA LINEARIFOLIA SHRUBLAND ALLIANCE (A.819)
  Cleome isomeris - Ephedra californica - Ericameria linearifolia Shrubland [Placeholder] (CEGL003056)
- ERIOGONUM DESERTICOLA SPARSELY VEGETATED ALLIANCE (A.1856)
  Eriogonum deserticola Sand Dune Sparse Vegetation (CEGL001962)
- HELIOTROPIUM CONVOLVULACEUM SPARSELY VEGETATED ALLIANCE (A.1853)
  Heliotropium convolvulaceum - Psoralidium lanceolatum - Polanisia jamesii Sparse Vegetation (CEGL004581)
- HELIOTROPIUM RACEMOSUM SPARSELY VEGETATED ALLIANCE (A.1854)
  Heliotropium racemosum - Chamaesyce sp. Sparse Vegetation (CEGL004582)
- POLIOMINTHA INCANA SHRUBLAND ALLIANCE (A.862)
  Poliomintha incana / Muhlenbergia pungens Shrubland (CEGL002672)
- PROSOPIS GLANDULOSA SHRUBLAND ALLIANCE (A.1031)
  Prosopis glandulosa / Atriplex canescens Shrubland (CEGL001382)
  Prosopis glandulosa / Sporobolus flexuosus Shrubland (CEGL001386)
- PSOROTHAMNUS POLYDENIUS SHRUBLAND ALLIANCE (A.1039)
  Psorothamnus polydenius var. polydenius / Achnatherum hymenoides Shrubland (CEGL001353)



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- PSOROTHAMNUS SPINOSUS INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.2520)
  Psorothamnus spinosus Shrubland [Placeholder] (CEGL002701)
- SPOROBOLUS FLEXUOSUS HERBACEOUS ALLIANCE (A.1268)
  Sporobolus flexuosus - Dasyochloa pulchella Herbaceous Vegetation (CEGL001693)
  Sporobolus flexuosus - Paspalum setaceum Herbaceous Vegetation (CEGL001694)
  Sporobolus flexuosus - Sporobolus contractus Herbaceous Vegetation (CEGL001696)

- **California community types:**
- Cismontane and Desert Interior Dunes (22.000.00)
- Active Desert Dunes and Sand Fields (22.010.00)
- Desert Sand-verbena (22.100.00)
- Stabilized and Partially Stabilized Desert Dunes (22.300.00)
- Stabilized and Partially Stabilized Desert Sand Fields (22.400.00)
- San Joaquin Valley Dunes (22.500.00)
- Sonoran Dune Scrub (33.010.02)
- Creosote Bush - Big Galleta (33.010.13)
- Creosote Bush - Big Galleta - Anderson's Wolfberry (33.010.14)
- Big Galleta (41.030.01)
- Big Galleta - Rayless Goldenhead (41.030.02)
- Big Galleta - Cooper's Goldenbush (41.030.03)
- Big Galleta - Downy Dalea (41.030.04)
- Desert Needlegrass Grassland (41.090.00)
- Indian Ricegrass (41.120.00)
- Mesquite Dune Scrub (61.510.01)

### SOURCES

**References:** Bowers 1982, Bowers 1984, Holland and Keil 1995, MacMahon 1988, Powell and Turner 1974, Thomas et al. 2003a

**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS

**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.743 NORTH AMERICAN WARM DESERT BADLAND

Division 302, Barren

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**Spatial Scale & Pattern:** Small Patch **Classification Confidence:** low

**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland

**Diagnostic Classifiers:** Badlands, Badland, Alkaline Soil, Shale and Mudstone, Silt Soil Texture, Clay Soil Texture

**Non-Diagnostic Classifiers:** Lowland [Lowland], Shrubland (Shrub-dominated), Moss/Lichen (Nonvascular), Tropical/Subtropical [Tropical Xeric], Temperate [Temperate Xeric], Aridic, Very Short Disturbance Interval

**Concept Summary:** This ecological system is restricted to barren and sparsely vegetated (generally <10% plant cover) substrates typically derived from marine shale or mudstone (badlands and mudhills). The harsh soil properties and high rate of erosion and deposition are driving environmental variables supporting sparse shrubs and dwarf-shrubs e.g., *Atriplex hymenelytra*, and herbaceous vegetation.

### DISTRIBUTION

**Ecological Divisions:** 302

**TNC Ecoregions:** 17:C, 22:P, 23:P, 24:C

**Subnations/Nations:** AZ:c, MXCH:p, MXSO:p, NM:c, TX:p

### CONCEPT

**Alliances and Associations:**

- ATRIPLEX HYMENELYTRA SHRUBLAND ALLIANCE (A.872)
  Atriplex hymenelytra Shrubland (CEGL001317)
- CLEOME ISOMERIS - EPHEDRA CALIFORNICA - ERICAMERIA LINEARIFOLIA SHRUBLAND ALLIANCE (A.819)
  Cleome isomeris - Ephedra californica - Ericameria linearifolia Shrubland [Placeholder] (CEGL003056)

- **California community types:**
- Gypsum (99.900.02)
- Mud hills (99.900.03)



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### SOURCES

**References:** Thomas et al. 2003a
**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS, LACD
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

## CES302.745 NORTH AMERICAN WARM DESERT BEDROCK CLIFF AND OUTCROP

Division 302, Barren

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland
**Diagnostic Classifiers:** Canyon, Cliff (Landform), Rock Outcrops/Barrens/Glades, Temperate [Temperate Xeric]

**Non-Diagnostic Classifiers:** Montane [Upper Montane], Montane [Montane], Montane [Lower Montane], Lowland [Foothill], Lowland [Lowland], Rockfall avalanche, Ridge/Summit/Upper Slope, Sideslope, Toeslope/Valley Bottom, Granitic Rock, Sedimentary Rock, Metamorphic Rock, Igneous Rock, Tropical/Subtropical [Tropical Xeric], Very Shallow Soil

**Concept Summary:** This ecological system is found from subalpine to foothill elevations and includes barren and sparsely vegetated landscapes (generally <10% plant cover) of steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock types. Also included are unstable scree and talus slopes that typically occur bellow cliff faces. Species present are diverse and may include *Bursera microphylla, Fouquieria splendens, Nolina bigelovii, Opuntia bigelovii*, and other desert species, especially succulents. Lichens are predominant lifeforms in some areas. May include a variety of desert shrublands less than 2 ha (5 acres) in size from adjacent areas.

### DISTRIBUTION

**Ecological Divisions:** 302
**TNC Ecoregions:** 17:C, 22:C, 23:C, 24:C
**Subnations/Nations:** AZ:c, CA:c, MXBC:c, MXBS:c, MXCH:c, MXSO:c, NM:c, NV:c, TX:c

### CONCEPT

**Alliances and Associations:**

- FOUQUIERIA SPLENDENS SHRUBLAND ALLIANCE (A.863)
  Fouquieria splendens / Bouteloua hirsuta Shrubland (CEGL001377)
  Fouquieria splendens Shrubland [Placeholder] (CEGL004452)
- LARREA TRIDENTATA SHRUBLAND ALLIANCE (A.851)
  Larrea tridentata - Jatropha dioica var. graminea Shrubland (CEGL004566)
  Larrea tridentata - Opuntia schottii Shrubland (CEGL004567)
- OPUNTIA BIGELOVII SHRUBLAND ALLIANCE (A.877)
  Opuntia bigelovii Shrubland [Placeholder] (CEGL003065)

### SOURCES

**References:** Barbour and Major 1988, Dick-Peddie 1993, MacMahon 1988, MacMahon and Wagner 1985, Shreve and Wiggins 1964, Thomas et al. 2003a
**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS, LACD
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

## CES302.750 NORTH AMERICAN WARM DESERT PAVEMENT

Division 302, Barren

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland
**Diagnostic Classifiers:** Lowland [Lowland], Desert Pavement, Tropical/Subtropical [Tropical Xeric], Temperate [Temperate Xeric], W-Landscape/High Intensity

**Non-Diagnostic Classifiers:** Shrubland (Shrub-dominated), Toeslope/Valley Bottom, Aridic

**Concept Summary:** This ecological system occurs throughout much of the warm deserts of North America and is composed of unvegetated to very sparsely vegetated (<2% plant cover) landscapes, typically flat basins where extreme temperature and wind develop ground surfaces of fine to medium gravel coated with "desert varnish." Very low cover of desert scrub species such as *Larrea tridentata* or *Eriogonum fasciculatum* is usually present. However, ephemeral herbaceous species may have high cover in response to seasonal precipitation, including *Chorizanthe rigida, Eriogonum inflatum*, and *Geraea canescens*.



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### DISTRIBUTION

**Range:** Occurs throughout much of the warm deserts of North America.
**Ecological Divisions:** 302
**TNC Ecoregions:** 17:C, 23:C, 24:C
**Subnations/Nations:** AZ:c, CA:c, MXCH:c, MXSO:c, NM:c, NV:c, TX:c

### CONCEPT

**Alliances and Associations:**

- AMBROSIA DELTOIDEA SHRUBLAND ALLIANCE (A.852)
  Ambrosia deltoidea / Simmondsia chinensis Shrubland (CEGL000953)
- AMBROSIA DUMOSA DWARF-SHRUBLAND ALLIANCE (A.1102)
  Ambrosia dumosa - Larrea tridentata var. tridentata Dwarf-shrubland (CEGL000956)
- ERIOGONUM FASCICULATUM SHRUBLAND ALLIANCE (A.868)
  Eriogonum fasciculatum - Purshia glandulosa Shrubland (CEGL001259)
  Eriogonum fasciculatum Shrubland (CEGL001258)

### SOURCES

**References:** Barbour and Major 1988, MacMahon 1988, Thomas et al. 2003a
**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.751 NORTH AMERICAN WARM DESERT PLAYA

Division 302, Barren

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland, Wetland
**Diagnostic Classifiers:** Lowland [Lowland], Playa, Tropical/Subtropical [Tropical Xeric], Temperate [Temperate Xeric], Alkaline Soil, Aridic, Depressional, Alkaline Water, Saline Water Chemistry, Caliche Layer, Impermeable Layer, Intermittent Flooding

**Non-Diagnostic Classifiers:** Shrubland (Shrub-dominated), Woody-Herbaceous, Dwarf-Shrub, Forb, Graminoid, Clay Subsoil Texture

**Concept Summary:** This system is composed of barren and sparsely vegetated playas (generally <10% plant cover) found across the warm deserts of North America, extending into the extreme southern end of the San Joaquin Valley in California. Playas form with intermittent flooding, followed by evaporation, leaving behind a saline residue. Salt crusts are common throughout, with small saltgrass beds in depressions and sparse shrubs around the margins. Subsoils often include an impermeable layer of clay or caliche. Large desert playas tend to be defined by vegetation rings formed in response to salinity. Given their common location in wind-swept desert basins, dune fields often form downwind of large playas. In turn, playas associated with dunes often have a deeper water supply. Species may include *Allenrolfea occidentalis, Suaeda* spp., *Distichlis spicata, Eleocharis palustris, Oryzopsis* spp., *Sporobolus* spp., *Tiquilia* spp., or *Atriplex* spp. Ephemeral herbaceous species may have high cover periodically. Adjacent vegetation is typically Sonora-Mojave Desert Mixed Salt Desert Scrub (CES302.749), Chihuahuan Mixed Salt Desert Scrub (CES302.017), Gulf of California Coastal Mixed Salt Desert Scrub (CES302.015), Baja California del Norte Gulf Coast Ocotillo-Limberbush-Creosotebush Desert Scrub (CES302.014), or Chihuahuan Creosotebush Basin Desert Scrub (CES302.731).

### DISTRIBUTION

**Range:** Found across the warm deserts of North America, extending into the extreme southern end of the San Joaquin Valley in California.
**Ecological Divisions:** 302
**TNC Ecoregions:** 17:C, 22:C, 23:C, 24:C
**Subnations/Nations:** AZ:c, CA:c, MXBC:c, MXCH:c, MXSO:c, NM:c, NV:c, TX:c

### CONCEPT

**Alliances and Associations:**

- (SARCOCORNIA UTAHENSIS) - (ARTHROCNEMUM SUBTERMINALE) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1676)
  (Sarcocornia utahensis) - (Arthrocnemum subterminale) Seasonally Flooded Herbaceous Vegetation [Placeholder] (CEGL003120)
- ALLENROLFEA OCCIDENTALIS SHRUBLAND ALLIANCE (A.866)
  Allenrolfea occidentalis Shrubland (CEGL000988)
- ATRIPLEX (LENTIFORMIS, POLYCARPA) SHRUBLAND ALLIANCE (A.864)
  Atriplex (lentiformis, polycarpa) Shrubland [Placeholder] (CEGL003016)



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- ATRIPLEX POLYCARPA SHRUBLAND ALLIANCE (A.873)
  Atriplex polycarpa / Pleuraphis mutica Shrubland (CEGL001319)
  Atriplex polycarpa Shrubland (CEGL001318)
- ATRIPLEX SPINIFERA SHRUBLAND ALLIANCE (A.865)
  Atriplex spinifera Shrubland [Placeholder] (CEGL003015)
- BOUTELOUA BREVISETA SPARSELY VEGETATED ALLIANCE (A.1870)
  Bouteloua breviseta Sparse Vegetation (CEGL004609)
- SESUVIUM VERRUCOSUM TEMPORARILY FLOODED SPARSELY VEGETATED ALLIANCE (A.1865)
  Sesuvium verrucosum Sparse Vegetation (CEGL004595)

- **California community types:**
- Great Valley Iodine Bush Scrub (36.110.00)
- Saltgrass - Iodine Bush (36.120.01)
- Bush Seepweed - Iodine Bush (36.120.02)
- Alkali Sacaton - Iodine Bush (36.120.03)
- Iodine Bush (36.120.04)
- Great Valley Bush Seepweed Scrub (36.200.01)
- Desert Bush Seepweed Scrub (36.200.02)
- Bush Seepweed - Fourwing Saltbush (36.200.04)
- Desert Sink Scrub (36.700.00)
- Saltgrass - Alkali Rabbitbrush (41.200.04)
- Saltgrass - Alkali Heath - Jaumea (41.200.07)
- Mesquite Dry Lake (61.510.03)
- Playa (99.900.07)

### SOURCES

**References:** Barbour and Major 1988, Brown 1982, Dick-Peddie 1993, Holland and Keil 1995, Muldavin et al. 2000b, Thomas et al. 2003a

**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS

**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES302.754 NORTH AMERICAN WARM DESERT VOLCANIC ROCKLAND

Division 302, Barren

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland

**Diagnostic Classifiers:** Lava, Cinder, Basalt, Tropical/Subtropical [Tropical Xeric], Temperate [Temperate Xeric]

**Non-Diagnostic Classifiers:** Montane [Upper Montane], Montane [Montane], Montane [Lower Montane], Lowland [Foothill], Lowland [Lowland], Shrubland (Shrub-dominated), Ridge/Summit/Upper Slope, Sideslope, Toeslope/Valley Bottom, Aridic

**Concept Summary:** This ecological system occurs across the warm deserts of North America and is restricted to barren and sparsely vegetated (<10% plant cover) volcanic substrates such as basalt lava (malpais) and tuff. Vegetation is variable and includes a variety of species depending on local environmental conditions, e.g., elevation, age and type of substrate. Typically scattered *Larrea tridentata, Atriplex hymenelytra*, or other desert shrubs are present.

### DISTRIBUTION

**Range:** Occurs across the warm deserts of North America.

**Ecological Divisions:** 302

**TNC Ecoregions:** 17:C, 22:C, 23:C, 24:C

**Subnations/Nations:** AZ:c, CA:c, MXBC:c, MXCH:c, MXSO:c, NM:c, NV:c, TX:c

### CONCEPT

**Alliances and Associations:**

- ALOYSIA WRIGHTII SHRUBLAND ALLIANCE (A.1035)
  Aloysia wrightii / Perityle staurophylla Shrubland (CEGL001280)
- OPUNTIA BIGELOVII SHRUBLAND ALLIANCE (A.877)
  Opuntia bigelovii Shrubland [Placeholder] (CEGL003065)



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### SOURCES

**References:** Barbour and Major 1988, Brown 1982, Dick-Peddie 1993, Thomas et al. 2003a
**Last updated:** 20 Feb 2003 **Stakeholders:** WCS, SCS
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

## CES304.763 COLORADO PLATEAU BLACKBRUSH-MORMON-TEA SHRUBLAND

Division 304,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This ecological system occurs in the Colorado Plateau on benchlands, colluvial slopes, pediments or bajadas. Elevation ranges from 560-1600 m. Substrates are shallow, typically calcareous, non-saline and gravelly or sandy soils over sandstone or limestone bedrock, caliche or limestone alluvium. It also occurs in deeper soils on sandy plains where it may have invaded desert grasslands. The vegetation is characterized by an extensive open shrublands dominated by *Coleogyne ramosissima* often with *Ephedra viridis, Ephedra torreyana*, or *Grayia spinosa*. Sandy portions may include *Artemisia filifolia* as codominant. The herbaceous layer is sparse and composed of graminoids such as *Achnatherum hymenoides, Pleuraphis jamesii*, or *Sporobolus cryptandrus*.

### DISTRIBUTION

**Range:** Occurs in the Colorado Plateau on benchlands, colluvial slopes, pediments or bajadas. Elevation ranges from 560-1600 m.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ACHNATHERUM HYMENOIDES SHRUB HERBACEOUS ALLIANCE (A.1543)
  Ephedra viridis / Achnatherum hymenoides - Bouteloua gracilis Shrub Herbaceous Vegetation (CEGL001648)
  Ephedra viridis / Achnatherum hymenoides - Sporobolus cryptandrus Shrub Herbaceous Vegetation (CEGL001649)
- ARTEMISIA FILIFOLIA SHRUBLAND ALLIANCE (A.816)
  Artemisia filifolia / Bouteloua eriopoda Shrubland (CEGL001077)
  Artemisia filifolia Colorado Plateau Shrubland (CEGL002697)
- BOUTELOUA ERIOPODA XEROMORPHIC SHRUB HERBACEOUS ALLIANCE (A.1553)
  Ephedra torreyana / Bouteloua eriopoda Shrub Herbaceous Vegetation (CEGL001731)
- COLEOGYNE RAMOSISSIMA SHRUBLAND ALLIANCE (A.874)
  Coleogyne ramosissima / Pleuraphis jamesii Shrubland (CEGL001334)
  Coleogyne ramosissima Shrubland (CEGL001332)
- EPHEDRA NEVADENSIS - EPHEDRA VIRIDIS SHRUBLAND ALLIANCE (A.856)
  Ephedra nevadensis - Ephedra viridis - Salvia dorrii - Lycium andersonii Shrubland (CEGL001256)
- EPHEDRA NEVADENSIS SHRUBLAND ALLIANCE (A.857)
  Ephedra nevadensis / Achnatherum hymenoides Shrubland (CEGL001255)
- EPHEDRA VIRIDIS SHRUBLAND ALLIANCE (A.858)
  Ephedra viridis / Pleuraphis rigida Shrubland (CEGL001257)

**Environment:** This ecological system typically occurs on gentle to steep, bouldery or rocky slopes of mountains, canyons, and mesas with varying aspects. This system is an evergreen, microphyllous desert scrub with succulents, half-shrubs, and scattered deciduous shrubs typically found at elevations ranging from 580 to 1600 m. (1903-5249 feet). This shrubland system occurs in an arid to semi-arid climate with annual precipitation in the form of summer monsoons and winter storms averaging approximately 20 cm. Soils are highly variable and parent materials may include shale, sandstone, limestone, quartzites, and igneous rocks. Soils are generally coarse-textured, often rocky, shallow and well-drained. Effective soil moisture appears to be primarily controlled by regolith depth and position in relation to the water table. This brushland system occupies most sites where regolith is uniformly shallow. In association with blackbrush (*Coleogyne ramosissima*) sites, the soil moisture is concentrated on top of impermeable bedrock at a shallow depth. This perching effect allows for gradual uptake of moisture by the plants roots (Loope and West 1979). This permits growth of plants with more mesic habitat requirements (Warren et al. 1982). On sites with deep soil, blackbrush may occur in almost pure occurrences with only a few associated species (Warren et al. 1982). Dark-colored cryptogamic soil crusts, composed of lichens, mosses, fungi, and algae, are often present in this system in fairly undisturbed areas. Sandy soils may have more cryptogamic crusts than clayish or silty soil surfaces.

**Vegetation:** This ecological system is dominated by sparse to moderately dense shrubs. Dominant shrubs include *Coleogyne ramosissima, Ephedra nevadensis*, and *Ephedra viridis* (which may codominate with *Grayia spinosa, Salvia dorrii*, and *Lycium andersonii*). There is usually a sparse herbaceous layer with some perennial grasses and forbs. Annual grasses and



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forbs are present seasonally. Some characteristic species associated with this system include the shrubs *Gutierrezia sarothrae, Chrysothamnus viscidiflorus, Yucca baccata*, and *Krameria grayi*, succulents such as *Ferocactus cylindraceus (= Ferocactus acanthodes), Opuntia* spp., *Echinocereus* spp., *Echinocactus* spp., and *Agave* spp., the graminoid *Pleuraphis rigida*, and perennial forbs such as *Machaeranthera pinnatifida* and *Sphaeralcea ambigua*.

**Dynamics:** Fire does not appear to play a role in maintenance of shrublands within this system. Topographic breaks dissect the landscape, and isolated pockets of vegetation are separated by rock walls or steep canyons. Blackbrush is fire-intolerant (Loope and West 1979). Following fires, these communities are often colonized by non-native grasses, which serve to encourage recurrent fires and delay shrub regeneration (IVC 1999). In shallow regolith situations, secondary succession, in the sense of site preparation by seral plants, may not occur at all (Loope and West 1979).

### SPATIAL CHARACTERISTICS

**Adjacent Ecological Systems:** Adjacent vegetation often includes *Atriplex* dominated shrubland communities and upland areas of pinyon-juniper woodlands. Grasslands dominated by *Pleuraphis jamesii, Hesperostipa comata*, and *Achnatherum hymenoides* also occur.

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.765 COLORADO PLATEAU MIXED BEDROCK CANYON AND TABLELAND

Division 304,

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**Spatial Scale & Pattern:** Matrix **Classification Confidence:** low
**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland
**Concept Summary:** The distribution of this ecological system is centered on the Colorado Plateau where it is comprised of barren and sparsely vegetated landscapes (generally <10% plant cover) of steep cliff faces, narrow canyons, and open tablelands of predominantly sedimentary rocks, such as sandstone, shale, and limestone. Some eroding shale layers similar to Inter-Mountain Basins Shale Badland (CES304.789) may be interbedded between the harder rocks. The vegetation is characterized by very open tree canopy or scattered trees and shrubs with a sparse herbaceous layer. Common species includes *Pinus edulis, Pinus ponderosa, Juniperus* spp., *Cercocarpus intricatus*, and other short-shrub and herbaceous species, utilizing moisture from cracks and pockets where soil accumulates.

**Comments:** Geographically restricted and distinct from the related, but broader Inter-Mountain Basins Cliff and Canyon (CES304.779). Shale areas are not extensive as in shale badlands.

### DISTRIBUTION

**Range:** Colorado Plateau.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- CERCOCARPUS INTRICATUS SPARSELY VEGETATED ALLIANCE (A.2543)
  Cercocarpus intricatus Slickrock Sparse Vegetation (CEGL002977)
- CERCOCARPUS MONTANUS SPARSELY VEGETATED ALLIANCE (A.2544)
  Cercocarpus montanus Rock Pavement Sparse Vegetation (CEGL002978)
- EPHEDRA TORREYANA SPARSELY VEGETATED ALLIANCE (A.2571)
  Ephedra torreyana - (Atriplex canescens, Atriplex confertifolia) Sparse Vegetation (CEGL005801)
- JUNIPERUS OSTEOSPERMA WOODLAND ALLIANCE (A.536)
  Juniperus osteosperma / Artemisia nova / Rock Woodland (CEGL000729)
  Juniperus osteosperma / Cercocarpus intricatus Woodland (CEGL000733)
- PINUS EDULIS - (JUNIPERUS SPP.) WOODLAND ALLIANCE (A.516)
  Pinus edulis - Juniperus osteosperma / Cercocarpus intricatus Woodland (CEGL000779)
- SANDSTONE SPARSELY VEGETATED ALLIANCE (A.2568)
  Atriplex canescens - (Ephedra viridis) / (Muhlenbergia porteri) Sandstone Sparse Vegetation [Provisional] (CEGL002927)
- WOODED BEDROCK SPARSELY VEGETATED ALLIANCE (A.2546)
  Pinus ponderosa Slickrock Sparse Vegetation (CEGL002972)

**Environment:** This system includes limestone escarpments and plateaus occurring in a relatively narrow band of unvegetated or sparsely vegetated badlands formed by the red beds of Claron (Wasatch) Formation along the eastern edge of the Pausaugunt Plateau (Bryce Canyon) and the western edge of the Markagunt Plateau (Cedar Breaks National Monument)



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(Graybosch and Buchanan 1983). It includes areas of which often 90% of the exposed surface consists of barren rock. It forms, or includes, areas of fixed bedrock forming the vertical or near-vertical parts on the plateau faces. The rocks forming such areas are predominantly limestone-capped plateaus. These areas are highly erodible and form the basic scenic structure of Bryce Canyon and Cedar Breaks national parks. The area is generally too steep to allow any significant soil development. Scattered plants obtain a precarious foothold in the crevices of the rocks. Knolls may form at the base of the cliffs.

This ecological system also includes sandstone and shale escarpments, which form, or include, areas of fixed bedrock forming the vertical or near-vertical parts of canyon walls and plateau faces. The scenic cliffs of the East Tavaputs area, e.g., the Book Cliffs are excellent examples of this. The rocks forming such areas are dominantly sandstone and shale with some limestone and marlstone. These areas are unstable and rocks are frequently rolling down onto the talus slopes below (often forming Inter-Mountain Basins Shale Badland (CES304.789)). The area is generally too steep to allow any significant soil development. Scattered plants obtain a precarious foothold in the crevices of the rocks. Knolls may form at the base of the cliffs. The larger drainages (e.g., East Fork Parachute Creek) plunge several hundred feet at this escarpment, which creates scenic and lush hanging gardens. Many of these escarpments are over 1000 feet in height and provide excellent habitat for cliff-nesting birds such as peregrine falcons and golden eagles.

The Claron limestone, a Tertiary deposit, is divisible into Red Eocene beds and White Oligocene beds, which differ somewhat in presence or absence of pigmentation in the form of iron and manganese oxides, and in amounts of sand and conglomerates in the limestone (Graybosch and Buchanan 1983). The Claron Formation is characterized by a rapid rate of erosion, largely a function of creep resulting from winter freeze-thaw activity and wash away by summer thunderstorm runoff (Graybosch and Buchanan 1983). Freeze-thaw cycles are most pronounced on south-facing slopes. Soil development is limited. Infiltration rates are low and runoff high.

**Vegetation:** For the most part, this system is sparsely vegetated. Small patches of scattered trees and shrubs may occur. These small vegetated patches are usually dominated by conifer trees, and may include *Abies concolor, Juniperus scopulorum, Picea pungens, Pinus flexilis, Pinus longaeva, Pinus ponderosa*, and *Pseudotsuga menziesii*. If a shrub layer exists it may include *Acer glabrum, Amelanchier utahensis, Arctostaphylos patula, Ceanothus martinii, Cercocarpus montanus, Cercocarpus intricatus, Juniperus communis, Mahonia repens, Purshia tridentata, Ribes cereum*, and *Gutierrezia sarothrae*. Grasses and forbs, if present, may include *Astragalus kentrophyta, Cirsium arizonicum, Clematis columbiana, Leymus salinus, Eriogonum panguicense, Achnatherum hymenoides*, and *Linum kingii*.

This ecological system is noted for its high rate of endemic species of forbs, especially in Bryce Canyon. Nine of the eleven endemic species occur in the *Pinus longaeva* community, three are found in the *Pinus ponderosa - Arctostaphylos patula* plant association, and two occur in the mixed conifer type. Species that occur only in the *Pinus longaeva* type have the narrowest geographic distributions, although *Eriogonum panguicense var. panguicense* is an exception (Graybosch and Buchanan 1983). Within Bryce Canyon, most of these endemics are restricted to the Claron Formation (Graybosch and Buchanan 1983). The majority of endemic species found in southern Utah are restricted to substrates derived from a specific geologic formation (Welsh 1979). Welsh notes that most of these taxa are found in areas of exposed parent material. The distribution of endemic species in Utah is not a random one; fine-textured substrates support more species than coarser ones, and desert and foothill vegetation is richer in endemic species than montane communities (Welsh 1978, 1979).

**Dynamics:** This ecological system has a naturally high rate of erosion. Fires are infrequent and not an important ecological process.

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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**CES304.045 GREAT BASIN FOOTHILL AND LOWER MONTANE RIPARIAN WOODLAND AND SHRUBLAND**
Division 304,

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**Spatial Scale & Pattern:** Linear
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland
**Concept Summary:** This system occurs in mountain ranges of the Great Basin and along the eastern slope of the Sierra Nevada within a broad elevation range from about 1220 m (4000 feet) to over 2135 m (7000 feet). This system often occurs as a mosaic of multiple communities that are tree-dominated with a diverse shrub component. The variety of plant associations connected to this system reflects elevation, stream gradient, floodplain width, and flooding events. Dominant trees may include *Abies concolor, Alnus incana, Betula occidentalis, Populus angustifolia, Populus balsamifera ssp.*



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*trichocarpa, Populus fremontii, Salix laevigata, Salix gooddingii*, and *Pseudotsuga menziesii*. Dominant shrubs include *Artemisia cana, Cornus sericea, Salix exigua, Salix lasiolepis, Salix lemmonii*, or *Salix lutea*. Herbaceous layers are often dominated by species of *Carex* and *Juncus*, and perennial grasses and mesic forbs such *Deschampsia caespitosa, Elymus trachycaulus, Glyceria striata, Iris missouriensis, Maianthemum stellatum*, or *Thalictrum fendleri*. Introduced forage species such as *Agrostis stolonifera, Poa pratensis, Phleum pratense*, and the weedy annual *Bromus tectorum* are often present in disturbed stands. These are disturbance-driven systems that require flooding, scour and deposition for germination and maintenance. Livestock grazing is a major influence in altering structure, composition, and function of the community.

### DISTRIBUTION

**Range:** Occurs in mountain ranges of the Great Basin and along the eastern slope of the Sierra Nevada within a broad elevation range from about 1220 m (4000 feet) to over 2135 m (7000 feet).
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ALNUS INCANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.950)
  Alnus incana / Cornus sericea Shrubland (CEGL001145)
- ARTEMISIA CANA (SSP. BOLANDERI, SSP. VISCIDULA) SHRUBLAND ALLIANCE (A.2557)
  Artemisia cana (ssp. bolanderi, ssp. viscidula) / Leymus cinereus Shrubland (CEGL001460)
  Artemisia cana ssp. viscidula / Deschampsia caespitosa Shrubland (CEGL001074)
- ARTEMISIA NOVA SHRUBLAND ALLIANCE (A.1105)
  Artemisia nova - Ericameria nana Shrubland (CEGL002773)
- BETULA OCCIDENTALIS SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.996)
  Betula occidentalis / Mesic Graminoids Shrubland (CEGL002654)
- BETULA OCCIDENTALIS TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.967)
  Betula occidentalis / Cornus sericea Shrubland (CEGL001161)
  Betula occidentalis / Maianthemum stellatum Shrubland (CEGL001162)
- CORNUS SERICEA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.968)
  Cornus sericea Shrubland (CEGL001165)
- POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED WOODLAND ALLIANCE (A.641)
  Populus angustifolia / Betula occidentalis Woodland (CEGL000648)
  Populus angustifolia / Rhus trilobata Woodland (CEGL000652)
- POPULUS BALSAMIFERA SSP. TRICHOCARPA TEMPORARILY FLOODED FOREST ALLIANCE (A.311)
  Populus balsamifera ssp. trichocarpa / Alnus incana Forest (CEGL000667)
  Populus balsamifera ssp. trichocarpa / Mixed Herbs Forest (CEGL000675)
- POPULUS FREMONTII SEASONALLY FLOODED WOODLAND ALLIANCE (A.654)
  Populus fremontii / Leymus triticoides Woodland (CEGL002756)
  Populus fremontii / Salix geyeriana Woodland (CEGL000943)
- POPULUS FREMONTII TEMPORARILY FLOODED FOREST ALLIANCE (A.313)
  Populus fremontii / Salix exigua Forest (CEGL000666)
- SALIX LASIOLEPIS TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.977)
  Salix lasiolepis / Rosa woodsii / Mixed Herbs Shrubland (CEGL001217)
- SALIX LEMMONII SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.2523)
  Salix lemmonii / Mesic-Tall Forbs Shrubland (CEGL002771)
  Salix lemmonii / Rosa woodsii Shrubland (CEGL002772)
- SALIX LUTEA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.1007)
  Salix lutea / Carex utriculata Shrubland (CEGL001220)
- SALIX LUTEA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.980)
  Salix lutea / Mesic Forbs Shrubland (CEGL002774)

### SOURCES

**Last updated:** 16 Apr 2003 **Stakeholders:**
**Concept Author:** J. Nachlinger and K. Schulz **LeadResp:** WCS

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## CES304.773 GREAT BASIN PINYON-JUNIPER WOODLAND

Division 304,

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**Spatial Scale & Pattern:** Matrix **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This ecological system occurs on dry mountain ranges of the Great Basin region and eastern foothills of the Sierra Nevada. It is typically found at lower elevations ranging from 1600-2600 m. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts



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on mountainsides. Woodlands dominated by a mix of *Pinus monophylla* and *Juniperus osteosperma*, pure or nearly pure occurrences of *Pinus monophylla*, or woodlands dominated solely by *Juniperus osteosperma* comprise this system. *Cercocarpus ledifolius* is a common associate. Understory layers are variable. Associated species include shrubs such as *Arctostaphylos patula, Artemisia arbuscula, Artemisia nova, Artemisia tridentata, Cercocarpus ledifolius, Cercocarpus intricatus, Coleogyne ramosissima, Quercus gambelii, Quercus turbinella*, and bunch grasses *Hesperostipa comata, Festuca idahoensis, Pseudoroegneria spicata, Leymus cinereus (= Elymus cinereus)*, and *Poa fendleriana*. This system occurs at lower elevations than Colorado Plateau Pinyon-Juniper Woodland (CES304.767) where sympatric.

### DISTRIBUTION

**Range:** Occurs on dry mountain ranges of the Great Basin region and eastern foothills of the Sierra Nevada, typically at lower elevations ranging from 1600-2600 m.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- JUNIPERUS OSTEOSPERMA WOODLAND ALLIANCE (A.536)
  Juniperus osteosperma / Artemisia arbuscula Woodland (CEGL002757)
  Juniperus osteosperma / Artemisia nova / Rock Woodland (CEGL000729)
  Juniperus osteosperma / Artemisia nova Woodland (CEGL000728)
  Juniperus osteosperma / Artemisia tridentata / Achnatherum hymenoides Woodland (CEGL000731)
  Juniperus osteosperma / Cercocarpus intricatus Woodland (CEGL000733)
  Juniperus osteosperma / Pseudoroegneria spicata Woodland (CEGL000738)
  Juniperus osteosperma / Sparse Understory Woodland (CEGL000732)
- JUNIPERUS SCOPULORUM TEMPORARILY FLOODED WOODLAND ALLIANCE (A.563)
  Juniperus scopulorum Temporarily Flooded Woodland [Placeholder] (CEGL002777)
- PINUS MONOPHYLLA - (JUNIPERUS OSTEOSPERMA) WOODLAND ALLIANCE (A.543)
  Pinus monophylla - Juniperus osteosperma - Quercus gambelii / Artemisia tridentata Woodland (CEGL000837)
  Pinus monophylla - Juniperus osteosperma / (Shepherdia rotundifolia, Amelanchier utahensis) Woodland (CEGL002942)
  Pinus monophylla - Juniperus osteosperma / Artemisia arbuscula Woodland (CEGL000830)
  Pinus monophylla - Juniperus osteosperma / Artemisia nova Woodland (CEGL000831)
  Pinus monophylla - Juniperus osteosperma / Artemisia tridentata ssp. vaseyana / Pseudoroegneria spicata Woodland (CEGL000833)
  Pinus monophylla - Juniperus osteosperma / Artemisia tridentata Woodland (CEGL000832)
  Pinus monophylla - Juniperus osteosperma / Cercocarpus ledifolius / Pseudoroegneria spicata Woodland (CEGL000834)
  Pinus monophylla - Juniperus osteosperma / Cercocarpus montanus - Quercus gambelii Woodland [Provisional] (CEGL002968)
  Pinus monophylla - Juniperus osteosperma / Coleogyne ramosissima Woodland [Provisional] (CEGL002971)
  Pinus monophylla - Juniperus osteosperma / Gutierrezia sarothrae / Pleuraphis jamesii Woodland [Provisional] (CEGL002970)
  Pinus monophylla - Juniperus osteosperma / Hesperostipa comata Woodland (CEGL002969)
  Pinus monophylla - Juniperus osteosperma / Prunus virginiana Woodland (CEGL000836)
  Pinus monophylla - Juniperus osteosperma / Quercus turbinella Woodland (CEGL002941)
  Pinus monophylla - Juniperus osteosperma / Sparse Understory Woodland (CEGL000829)
  Pinus monophylla - Quercus gambelii / Artemisia tridentata Woodland (CEGL000838)
  Pinus monophylla / Amelanchier alnifolia / Arctostaphylos patula Woodland (CEGL000826)
  Pinus monophylla / Artemisia tridentata Woodland (CEGL000827)
  Pinus monophylla / Cercocarpus ledifolius Woodland (CEGL000828)
  Pinus monophylla / Symphoricarpos oreophilus - Artemisia tridentata Woodland (CEGL000839)
  Pinus monophylla Woodland (CEGL000825)
- PINUS MONOPHYLLA WOODED TALL HERBACEOUS ALLIANCE (A.1487)
  Pinus monophylla - Juniperus osteosperma / Leymus cinereus Wooded Herbaceous Vegetation (CEGL000835)
- QUERCUS TURBINELLA SHRUBLAND ALLIANCE (A.793)
  Quercus turbinella - Juniperus osteosperma Shrubland (CEGL000981)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.001 GREAT BASIN SEMI-DESERT CHAPARRAL

Division 304,

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**Spatial Scale & Pattern:** Large Patch
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This system includes chaparral on sideslopes transitioning from low-elevation desert landscapes up into pinyon-juniper woodlands of the western and central Great Basin. There are limited occurrences extending as far west as the inner Coast Ranges in central California. These are typically fairly open-canopy shrublands with open spaces either bare or



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supporting patchy grasses and forbs. Characteristic species may include *Arctostaphylos patula, Arctostaphylos pungens, Ceanothus greggii, Cercocarpus montanus var. glaber, Cercocarpus intricatus, Eriogonum fasciculatum, Garrya flavescens, Quercus turbinella, Purshia stansburiana*, and *Rhus trilobata*. *Cercocarpus ledifolius* is generally absent. Typical fire regime in these systems varies with the amount of organic accumulation.

### DISTRIBUTION

**Range:** Western and central Great Basin.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ARCTOSTAPHYLOS PATULA SHRUBLAND ALLIANCE (A.788)
  Arctostaphylos patula - Artemisia tridentata ssp. vaseyana Shrubland (CEGL002694)
  Arctostaphylos patula - Quercus gambelii - (Amelanchier utahensis) Shrubland (CEGL002695)
  Arctostaphylos patula / Ceanothus velutinus - Ceanothus prostratus Shrubland (CEGL000957)
  Arctostaphylos patula Shrubland (CEGL002696)
- ARCTOSTAPHYLOS PUNGENS SHRUBLAND ALLIANCE (A.789)
  Arctostaphylos pungens Shrubland (CEGL000958)
- CEANOTHUS GREGGII - FREMONTODENDRON CALIFORNICUM SHRUBLAND ALLIANCE (A.766)
  Ceanothus greggii - Fremontodendron californicum Shrubland [Placeholder] (CEGL003026)
- CEANOTHUS LEUCODERMIS SHRUBLAND ALLIANCE (A.767)
  Ceanothus leucodermis Shrubland [Placeholder] (CEGL003028)
- CERCOCARPUS MONTANUS - ERIOGONUM FASCICULATUM SHRUBLAND ALLIANCE (A.848)
  Cercocarpus montanus var. glaber - Eriogonum fasciculatum Shrubland [Placeholder] (CEGL003036)
- PURSHIA (STANSBURIANA, MEXICANA) SHRUBLAND ALLIANCE (A.833)
  Purshia stansburiana / Pseudoroegneria spicata Shrubland (CEGL001053)
  Purshia stansburiana Shrubland [Provisional] (CEGL002957)
- QUERCUS TURBINELLA SHRUBLAND ALLIANCE (A.793)
  Quercus turbinella - (Amelanchier utahensis) Colluvial Shrubland (CEGL002950)
  Quercus turbinella - Ephedra viridis Shrubland (CEGL000980)
  Quercus turbinella - Juniperus osteosperma Shrubland (CEGL000981)

### SOURCES

**Last updated:** 24 Mar 2003 **Stakeholders:**
**Concept Author:** K. Schulz, P. Comer **LeadResp:** WCS

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## CES304.774 GREAT BASIN XERIC MIXED SAGEBRUSH SHRUBLAND

Division 304,

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This ecological system occurs in the Great Basin on dry flats and plains, alluvial fans, rolling hills, rocky hill slopes, saddles and ridges at elevations between 1000-2600 m. Sites are dry, often exposed to desiccating winds, with typically shallow, rocky, non-saline soils. Shrublands are dominated by *Artemisia nova* (mid and low elevations), *Artemisia arbuscula* (higher elevation), and may be codominated by *Artemisia tridentata ssp. wyomingensis* or *Chrysothamnus viscidiflorus*. Other shrubs that may be present include *Atriplex confertifolia, Ephedra* spp., *Ericameria* spp., *Grayia spinosa, Lycium shockleyi, Picrothamnus desertorum, Sarcobatus vermiculatus*, and *Tetradymia* spp. The herbaceous layer is likely sparse and composed of perennial bunch grasses such as *Achnatherum hymenoides, Achnatherum speciosum, Achnatherum thurberianum, Elymus elymoides*, or *Poa secunda*.

### DISTRIBUTION

**Range:** Occurs in the Great Basin on dry flats and plains, alluvial fans, rolling hills, rocky hill slopes, saddles and ridges at elevations between 1000-2600 m.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ARTEMISIA ARBUSCULA SSP. ARBUSCULA SHRUB HERBACEOUS ALLIANCE (A.1566)
  Artemisia arbuscula ssp. arbuscula - Purshia tridentata / Pseudoroegneria spicata - Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001518)
  Artemisia arbuscula ssp. arbuscula / Achnatherum thurberianum Shrub Herbaceous Vegetation (CEGL001413)
  Artemisia arbuscula ssp. arbuscula / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001409)
  Artemisia arbuscula ssp. arbuscula / Leymus salinus ssp. salmonis Shrub Herbaceous Vegetation (CEGL001410)



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Artemisia arbuscula ssp. arbuscula / Poa secunda Shrub Herbaceous Vegetation (CEGL001411)
Artemisia arbuscula ssp. arbuscula / Pseudoroegneria spicata Shrub Herbaceous Vegetation (CEGL001412)

- ARTEMISIA ARBUSCULA SSP. ARBUSCULA SHRUBLAND ALLIANCE (A.2547)
  Artemisia arbuscula ssp. arbuscula - Artemisia tridentata ssp. wyomingensis / Festuca idahoensis Shrubland [Provisional] (CEGL002983)
- ARTEMISIA ARBUSCULA SSP. LONGICAULIS SHRUBLAND ALLIANCE (A.2548)
  Artemisia arbuscula ssp. longicaulis - Grayia spinosa Shrubland (CEGL002984)
  Artemisia arbuscula ssp. longicaulis / Bromus tectorum Semi-natural Shrubland (CEGL002985)
  Artemisia arbuscula ssp. longicaulis / Elymus elymoides Shrubland (CEGL002986)
- ARTEMISIA ARBUSCULA SSP. LONGILOBA SHRUB HERBACEOUS ALLIANCE (A.2552)
  Artemisia arbuscula ssp. longiloba / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001522)
  Artemisia arbuscula ssp. longiloba / Pascopyrum smithii Shrub Herbaceous Vegetation (CEGL001415)
  Artemisia arbuscula ssp. longiloba / Poa secunda Shrub Herbaceous Vegetation (CEGL001523)
  Artemisia arbuscula ssp. longiloba / Pseudoroegneria spicata Shrub Herbaceous Vegetation (CEGL001416)
- ARTEMISIA ARBUSCULA SSP. LONGILOBA SHRUBLAND ALLIANCE (A.2549)
  Artemisia arbuscula ssp. longiloba Shrubland (CEGL001414)
- ARTEMISIA NOVA SHRUBLAND ALLIANCE (A.1105)
  Artemisia nova - Ericameria nana Shrubland (CEGL002773)
  Artemisia nova - Gutierrezia sarothrae / Bouteloua gracilis - Pleuraphis jamesii Shrubland (CEGL001419)
  Artemisia nova / Achnatherum hymenoides Shrubland (CEGL001422)
  Artemisia nova / Elymus elymoides Shrubland (CEGL001418)
  Artemisia nova / Hesperostipa comata Shrubland (CEGL001425)
  Artemisia nova / Pleuraphis jamesii Shrubland (CEGL001420)
  Artemisia nova / Poa fendleriana Shrubland (CEGL002698)
  Artemisia nova / Poa secunda Shrubland (CEGL001423)
  Artemisia nova / Pseudoroegneria spicata Shrubland (CEGL001424)
  Artemisia nova Shrubland (CEGL001417)
- ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUB HERBACEOUS ALLIANCE (A.1527)
  Artemisia tridentata ssp. wyomingensis / Mixed Grasses Shrub Herbaceous Vegetation (CEGL001534)
  Artemisia tridentata ssp. wyomingensis / Pseudoroegneria spicata Shrub Herbaceous Vegetation (CEGL001535)
- ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUBLAND ALLIANCE (A.832)
  Artemisia tridentata ssp. wyomingensis - Atriplex confertifolia Shrubland (CEGL001040)
  Artemisia tridentata ssp. wyomingensis - Purshia tridentata / Pseudoroegneria spicata Shrubland (CEGL001050)
  Artemisia tridentata ssp. wyomingensis / Achnatherum hymenoides Shrubland (CEGL001046)
  Artemisia tridentata ssp. wyomingensis / Achnatherum thurberianum Shrubland (CEGL001052)
  Artemisia tridentata ssp. wyomingensis / Balsamorhiza sagittata Shrubland (CEGL000994)
  Artemisia tridentata ssp. wyomingensis / Bouteloua gracilis Shrubland (CEGL001041)
  Artemisia tridentata ssp. wyomingensis / Elymus elymoides Shrubland (CEGL001043)
  Artemisia tridentata ssp. wyomingensis / Hesperostipa comata Shrubland (CEGL001051)
  Artemisia tridentata ssp. wyomingensis / Poa secunda Shrubland (CEGL001049)
  Artemisia tridentata ssp. wyomingensis / Pseudoroegneria spicata Shrubland (CEGL001009)
- GRAYIA SPINOSA SHRUBLAND ALLIANCE (A.1038)
  Grayia spinosa / Artemisia nova / Achnatherum speciosum Shrubland (CEGL001344)

**Environment:** This ecological system is widely distributed in the western United States. Climate is generally arid with 20 to 30 cm of annual precipitation and warm summers and cold winters. This shrubland system occurs at elevations from 1000 to 2600 m in the southwestern United States. It occupies flat to steeply sloping upland sites, on a wide variety of landform positions. These include toeslopes, lower and middle slopes, badly eroded badland slopes, and foothills. Sites with little slope tend to have deep soils, while those with steeper slopes have shallow to moderately deep soils that are well-drained. Sloping sites tend to have southerly aspects. Soil texture is loam, sandy loam, or clay loam (Hansen and Hoffman 1988), and there is often a significant amount of coarse fragments in the soil profile. Hironaka et al. (1983) reported that most of the habitat occurred on calcareous soils, often with a cemented duripan or silica hardpan at about 1 m in depth.

**Dynamics:** This shrubland system is associated with shallow, rocky soils which experience extreme drought in summer. The plants are low and widely spaced, which tends to decrease the risk of fire (Chappell et al. 1997). Barbour and Major (1988) report that *Artemisia nova* is utilized by livestock to a much greater degree than other species of *Artemisia*, resulting in low, pruned plants. *Artemisia nova* dwarf-shrublands grow in more xeric sites than other *Artemisia* shrublands. Blackburn and Tueller (1970) noted rapid invasion of these communities by *Juniperus osteosperma* and *Pinus monosperma* in Nevada, citing overgrazing coupled with fire suppression, and possibly climate change as causative variables.

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS



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## CES304.775 INTER-MOUNTAIN BASINS ACTIVE AND STABILIZED DUNE

Division 304,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland

**Concept Summary:** This ecological system occurs in the Intermountain basins and is composed of unvegetated to moderately vegetated (<10-30% plant cover), active and stabilized dunes and sandsheets. Species occupying these environments are often adapted to the shifting, coarse-textured substrate (usually quartz sand) and form patchy or open grasslands, shrublands or steppe composed of *Achnatherum hymenoides, Artemisia filifolia, Artemisia tridentata ssp. tridentata, Atriplex canescens, Ephedra* spp., *Coleogyne ramosissima, Ericameria nauseosa, Leymus flavescens, Prunus virginiana, Psoralidium lanceolatum, Purshia tridentata, Sporobolus airoides, Tetradymia tetrameres*, or *Tiquilia* spp.

### DISTRIBUTION

**Range:** Occurs in the Intermountain basins.

**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ACHNATHERUM HYMENOIDES HERBACEOUS ALLIANCE (A.1262)
  Achnatherum hymenoides - Psoralidium lanceolatum Herbaceous Vegetation (CEGL001650)
  Achnatherum hymenoides - Sporobolus contractus Herbaceous Vegetation (CEGL001652)
- ARTEMISIA FILIFOLIA SHRUBLAND ALLIANCE (A.816)
  Artemisia filifolia - Ephedra (torreyana, viridis) Shrubland (CEGL002786)
- ELYMUS LANCEOLATUS HERBACEOUS ALLIANCE (A.1242)
  Elymus lanceolatus - Phacelia hastata Herbaceous Vegetation (CEGL001745)
- EPHEDRA TORREYANA SHRUBLAND ALLIANCE (A.2572)
  Ephedra torreyana - Achnatherum hymenoides Hummock Shrubland (CEGL005802)
- ERICAMERIA NAUSEOSA SHRUBLAND ALLIANCE (A.835)
  Ericameria nauseosa / Leymus flavescens / Psoralidium lanceolatum Shrubland (CEGL001329)
  Ericameria nauseosa Sand Deposit Sparse Shrubland (CEGL002980)
- LEYMUS FLAVESCENS HERBACEOUS ALLIANCE (A.1237)
  Leymus flavescens Herbaceous Vegetation (CEGL001563)
- PINUS PONDEROSA SPARSELY VEGETATED ALLIANCE (A.1859)
  Pinus ponderosa / Achnatherum hymenoides Sparse Vegetation (CEGL001490)
- POPULUS ANGUSTIFOLIA TEMPORARILY FLOODED FOREST ALLIANCE (A.310)
  Populus angustifolia Sand Dune Forest (CEGL002643)
- PSOROTHAMNUS POLYDENIUS SHRUBLAND ALLIANCE (A.1039)
  Psorothamnus polydenius var. polydenius / Achnatherum hymenoides Shrubland (CEGL001353)
- PURSHIA TRIDENTATA SHRUBLAND ALLIANCE (A.825)
  Purshia tridentata - Artemisia tridentata ssp. tridentata Shrubland (CEGL001054)
  Purshia tridentata - Ericameria nauseosa Shrubland (CEGL001056)
  Purshia tridentata / Achnatherum hymenoides Shrubland (CEGL001058)
  Purshia tridentata / Prunus virginiana Shrubland (CEGL001060)
- REDFIELDIA FLEXUOSA HERBACEOUS ALLIANCE (A.2505)
  Redfieldia flexuosa - (Psoralidium lanceolatum) Herbaceous Vegetation (CEGL002917)
- ROCK OUTCROP SPARSELY VEGETATED ALLIANCE (A.1838)
  Redbeds (Siltstone, Sandstone, Gypsum) Sparse Vegetation (CEGL005261)
- SARCOBATUS VERMICULATUS SHRUBLAND ALLIANCE (A.1041)
  Sarcobatus vermiculatus Dune Shrubland (CEGL001364)
- TETRADYMIA TETRAMERES SPARSELY VEGETATED ALLIANCE (A.2525)
  Tetradymia tetrameres Dune Sparse Vegetation (CEGL002759)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**

**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

## CES304.776 INTER-MOUNTAIN BASINS ASPEN-MIXED CONIFER FOREST AND WOODLAND

Division 304,

**Spatial Scale & Pattern:** Matrix **Classification Confidence:** low

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland

**Concept Summary:** This ecological system occurs on montane slopes and plateaus in Utah, eastern Nevada, southern Idaho and western Wyoming. Elevations range from 1700 to 2800 m. Occurrences are typically on gentle to steep slopes on any



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aspect, but are often found on clay-rich soils in intermontane valleys. Soils are derived from alluvium, colluvium and residuum from a variety of parent materials, but most typically occur on sedimentary rocks. The tree canopy is composed of a mix of deciduous and coniferous species, codominated by *Populus tremuloides* and conifers, including *Pseudotsuga menziesii, Abies concolor, Abies lasiocarpa, Picea engelmannii, Picea pungens, Pinus contorta, Pinus flexilis*, and *Pinus ponderosa*. As the occurrences age, *Populus tremuloides* is slowly reduced until the conifer species become dominant. Common shrubs include *Amelanchier alnifolia, Prunus virginiana, Acer grandidentatum, Symphoricarpos oreophilus, Juniperus communis, Paxistima myrsinites, Rosa woodsii, Spiraea betulifolia, Symphoricarpos albus*, or *Mahonia repens*. Herbaceous species include *Bromus carinatus, Calamagrostis rubescens, Carex geyeri, Elymus glaucus, Poa* spp. and *Stipa* spp., *Achillea millefolium, Arnica cordifolia*, Asteraceae spp., *Erigeron* spp., *Galium boreale, Geranium viscosissimum, Lathyrus* spp., *Lupinus argenteus, Mertensia arizonica, Mertensia lanceolata, Maianthemum stellatum, Osmorhiza berteroi (= Osmorhiza chilensis)*, and *Thalictrum fendleri*. Most occurrences at present represent a late-seral stage of aspen changing to a pure conifer occurrence. Nearly a hundred years of fire suppression and livestock grazing have converted much of the pure aspen occurrences to the present-day aspen-conifer forest and woodland ecological system.

### DISTRIBUTION

**Range:** Occurs on montane slopes and plateaus in Utah, eastern Nevada, southern Idaho and western Wyoming. Elevations range from 1700 to 2800 m.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ABIES CONCOLOR - POPULUS TREMULOIDES FOREST ALLIANCE (A.419)
  Populus tremuloides - Abies concolor / Arctostaphylos patula Forest (CEGL000522)
  Populus tremuloides - Abies concolor / Poa pratensis Semi-natural Forest (CEGL002947)
  Populus tremuloides - Abies concolor / Symphoricarpos oreophilus Forest (CEGL000523)
- ABIES LASIOCARPA - POPULUS TREMULOIDES FOREST ALLIANCE (A.422)
  Populus tremuloides - Abies lasiocarpa / Amelanchier alnifolia Forest (CEGL000524)
  Populus tremuloides - Abies lasiocarpa / Carex geyeri Forest (CEGL000525)
  Populus tremuloides - Abies lasiocarpa / Carex rossii Forest (CEGL000526)
  Populus tremuloides - Abies lasiocarpa / Juniperus communis Forest (CEGL000527)
  Populus tremuloides - Abies lasiocarpa / Pedicularis racemosa Forest (CEGL000528)
  Populus tremuloides - Abies lasiocarpa / Shepherdia canadensis Forest (CEGL000529)
  Populus tremuloides - Abies lasiocarpa / Symphoricarpos oreophilus / Bromus carinatus Forest (CEGL000530)
  Populus tremuloides - Abies lasiocarpa / Symphoricarpos oreophilus / Tall Forbs Forest (CEGL000531)
  Populus tremuloides - Abies lasiocarpa / Symphoricarpos oreophilus / Thalictrum fendleri Forest (CEGL000532)
  Populus tremuloides - Abies lasiocarpa / Tall Forbs Forest (CEGL000533)
  Populus tremuloides - Abies lasiocarpa / Thalictrum fendleri Forest (CEGL000534)
- PICEA PUNGENS - POPULUS TREMULOIDES FOREST ALLIANCE (A.423)
  Populus tremuloides - Picea pungens Forest (CEGL000535)
- PINUS CONTORTA - POPULUS TREMULOIDES FOREST ALLIANCE (A.424)
  Populus tremuloides - Pinus contorta / Carex geyeri Forest (CEGL000536)
  Populus tremuloides - Pinus contorta / Juniperus communis Forest (CEGL000537)
  Populus tremuloides - Pinus contorta / Symphoricarpos oreophilus Forest (CEGL000538)
  Populus tremuloides - Pinus contorta / Thalictrum fendleri Forest (CEGL000539)
- PINUS FLEXILIS - POPULUS TREMULOIDES FOREST ALLIANCE (A.425)
  Populus tremuloides - Pinus flexilis Forest (CEGL000540)
- PINUS PONDEROSA - POPULUS TREMULOIDES FOREST ALLIANCE (A.399)
  Pinus ponderosa - Populus tremuloides / Carex spp. - (Poa spp.) Forest (CEGL000191)
  Populus tremuloides - Pinus ponderosa Rocky Mountain Forest (CEGL000541)
- POPULUS TREMULOIDES - PSEUDOTSUGA MENZIESII FOREST ALLIANCE (A.426)
  Populus tremuloides - Pseudotsuga menziesii / Amelanchier alnifolia Forest (CEGL000543)
  Populus tremuloides - Pseudotsuga menziesii / Calamagrostis rubescens Forest (CEGL000544)
  Populus tremuloides - Pseudotsuga menziesii / Juniperus communis Forest (CEGL000545)
  Populus tremuloides - Pseudotsuga menziesii / Symphoricarpos oreophilus Forest (CEGL000546)

**Environment:** The aspen-conifer forest and woodland ecological system is very similar to the aspen forest ecological system with regards to environmental characteristics. It is usually found on montane slopes and plateaus in western Wyoming, Idaho, Utah, eastern Nevada. Elevations range from 1700 to 2800 m. Climate is temperate with cold winters. Mean annual precipitation is greater than 38 cm and typically greater than 50 cm. Occurrences are typically on gentle to steep slopes on any aspect. Soils are derived from alluvium, colluvium and residuum from a variety of parent materials, but most typically occur on sedimentary rocks.

Distribution of this ecological system is primarily limited by adequate soil moisture required to meet its high evapotranspiration demand (Mueggler 1988). Secondarily, its range is limited by the length of the growing season; or low



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temperatures (Mueggler 1988). Topography is variable, sites range from level to steep slopes. Aspect varies according to the limiting factors. Occurrences at high elevations are restricted by cold temperatures and are found on warmer southern aspects. At lower elevations aspen is restricted by lack of moisture and is found on cooler north aspects and mesic microsites. The soils are typically deep and well-developed with rock often absent from the soil. Soil texture ranges from sandy loam to clay loams. Parent materials are variable and may include sedimentary, metamorphic or igneous rocks, but it appears to grow best on limestone, basalt, and calcareous or neutral shales (Mueggler 1988).

**Vegetation:** The open to moderately closed, mixed evergreen needle-leaved and deciduous broad-leaved tree canopy is composed of short to moderately tall trees, and is codominated by *Populus tremuloides* and conifers, including *Pseudotsuga menziesii, Abies concolor, Abies lasiocarpa, Picea engelmannii, Picea pungens, Pinus contorta, Pinus flexilis*, and *Pinus ponderosa*. As the occurrences age, *Populus tremuloides* is slowly reduced until the conifer species becomes dominant (Mueggler 1988).

The sparse to moderately dense understory may be structurally complex and includes tall-shrub, short-shrub and herbaceous layers, or simple with just an herbaceous layer. Because of the open growth form of *Populus tremuloides*, more light can penetrate the canopy than in a pure conifer occurrence. Typically the understory is usually denser in younger occurrences that are dominated by *Populus tremuloides*, and in more mesic sites with open canopies. If present the tall-shrub layer may be dominated by *Amelanchier alnifolia, Prunus virginiana*, or *Acer grandidentatum*, and short-shrub by *Symphoricarpos oreophilus, Juniperus communis*, or *Mahonia repens*. Other common shrubs include *Paxistima myrsinites, Rosa woodsii, Spiraea betulifolia, Symphoricarpos albus*, and in wet areas *Salix scouleriana*. Where dense, the herbaceous layer is often dominated by graminoids such as *Bromus carinatus, Calamagrostis rubescens, Carex geyeri, Elymus glaucus, Poa* spp., and *Stipa* spp. More sparse herbaceous layers are generally a more even mixture of forbs like *Achillea millefolium, Arnica cordifolia, Eucephalus engelmannii (= Aster engelmannii), Erigeron speciosus, Fragaria vesca, Galium boreale, Geranium viscosissimum, Lathyrus* spp., *Lupinus argenteus, Mertensia arizonica, Mertensia lanceolata, Maianthemum stellatum, Osmorhiza berteroi (= Osmorhiza chilensis)*, and *Thalictrum fendleri*. Annuals are typically uncommon. The exotic species *Poa pratensis* and *Taraxacum officinale* are more common in livestock-impacted occurrences (Mueggler 1988).

**Dynamics:** *Populus tremuloides* is thin-barked and readily killed by fire. It is a fire-adapted species that generally needs a large disturbance to establish and maintain dominance in a forest. These mixed forests are generally seral and, in the absence of stand-replacing disturbance such as fire, will slowly convert to a conifer-dominated forest (Mueggler 1988). The natural fire-return interval is approximately 20 to 50 years for seral occurrences (USFS 1996). Intervals that approach 100 years are typical of late-seral occurrences (USFS 1996). Although the young conifer trees in these occurrences are susceptible to fire, older individuals develop self-pruned lower branches and develop a thick corky bark that make them resistant to ground fires. Most of the occurrences sampled by Mueggler (1988) have had a history of livestock grazing as evidenced by relative abundance of the exotic plants *Taraxacum officinale, Poa pratensis*, and other grazing-tolerant plants, and the scarcity of grazing-susceptible plants (Mueggler 1988). Most occurrences that we see today represent a late-seral stage of aspen changing to a pure conifer occurrence. Nearly a hundred years of fire suppression and livestock grazing have converted much of the pure aspen occurrences to the present-day aspen-conifer forest and woodland ecological system.

### SPATIAL CHARACTERISTICS

**Adjacent Ecological Systems:** Adjacent occurrences above or beside these mixed forests are typically pure aspen forest or mixed-conifer forest, or subalpine spruce-fir forest and woodlands, while lower elevations may include grasslands and shrublands.

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.777 INTER-MOUNTAIN BASINS BIG SAGEBRUSH SHRUBLAND

Division 304,

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**Spatial Scale & Pattern:** Matrix **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This ecological system occurs throughout much of the western U.S., typically in broad basins between mountain ranges, plains and foothills between 1500-2300 m elevation. Soils are typically deep, well-drained and non-saline. These shrublands are dominated by *Artemisia tridentata ssp. tridentata* and/or *Artemisia tridentata ssp. wyomingensis*. Scattered *Sarcobatus vermiculatus* and *Atriplex* spp. may be present in some stands. *Ericameria nauseosa* or *Chrysothamnus viscidiflorus* may codominate disturbed stands. Perennial herbaceous components typically contribute less than 25% vegetative cover. Common graminoid species include *Achnatherum hymenoides, Bouteloua gracilis, Elymus lanceolatus,*



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*Festuca idahoensis, Hesperostipa comata, Leymus cinereus, Pleuraphis jamesii, Pascopyrum smithii, Poa secunda*, or *Pseudoroegneria spicata.*

### DISTRIBUTION

**Range:** Occurs throughout much of the western U.S., typically in broad basins between mountain ranges, plains and foothills between 1500-2300 m elevation.

**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ARTEMISIA TRIDENTATA (SSP. TRIDENTATA, SSP. XERICENSIS) SHRUB HERBACEOUS ALLIANCE (A.1522)
  Artemisia tridentata (ssp. tridentata, ssp. xericensis) / Pseudoroegneria spicata - Poa secunda Shrub Herbaceous Vegetation (CEGL001019)
  Artemisia tridentata (ssp. tridentata, ssp. xericensis) / Pseudoroegneria spicata Shrub Herbaceous Vegetation (CEGL001018)
- ARTEMISIA TRIDENTATA (SSP. TRIDENTATA, SSP. XERICENSIS) SHRUBLAND ALLIANCE (A.830)
  Artemisia tridentata ssp. tridentata - Grayia spinosa Shrubland (CEGL001004)
  Artemisia tridentata ssp. tridentata / Distichlis spicata Shrubland (CEGL001000)
  Artemisia tridentata ssp. tridentata / Festuca idahoensis Shrubland (CEGL001014)
  Artemisia tridentata ssp. tridentata / Hesperostipa comata Shrubland (CEGL002966)
  Artemisia tridentata ssp. tridentata / Leymus cinereus Shrubland (CEGL001016)
  Artemisia tridentata ssp. tridentata / Pascopyrum smithii - (Elymus lanceolatus) Shrubland (CEGL001017)
  Artemisia tridentata ssp. tridentata / Pleuraphis jamesii Shrubland (CEGL001015)
  Artemisia tridentata ssp. tridentata / Poa secunda Shrubland (CEGL001008)
- ARTEMISIA TRIDENTATA SHRUB HERBACEOUS ALLIANCE (A.1521)
  Artemisia tridentata / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001530)
  Artemisia tridentata / Leymus cinereus Shrub Herbaceous Vegetation (CEGL001458)
- ARTEMISIA TRIDENTATA SHRUBLAND ALLIANCE (A.829)
  Artemisia tridentata - (Ericameria nauseosa) / Bromus tectorum Semi-natural Shrubland (CEGL002699)
  Artemisia tridentata / Achnatherum hymenoides Shrubland (CEGL001006)
  Artemisia tridentata / Achnatherum lettermanii Shrubland (CEGL001011)
  Artemisia tridentata / Bouteloua gracilis - Pascopyrum smithii Shrubland (CEGL000997)
  Artemisia tridentata / Bouteloua gracilis - Pleuraphis jamesii Shrubland (CEGL000996)
  Artemisia tridentata / Bouteloua gracilis Shrubland (CEGL000995)
  Artemisia tridentata / Chrysothamnus viscidiflorus / Poa secunda Shrubland (CEGL000999)
  Artemisia tridentata / Elymus elymoides Shrubland (CEGL001001)
  Artemisia tridentata / Ericameria nauseosa Shrubland (CEGL000998)
  Artemisia tridentata / Pleuraphis jamesii Shrubland (CEGL001005)
  Artemisia tridentata / Symphoricarpos longiflorus Shrubland (CEGL001012)
  Artemisia tridentata Shrubland (CEGL000991)
  Artemisia tridentata Upperzone Community Shrubland (CEGL001013)
- ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUB HERBACEOUS ALLIANCE (A.1527)
  Artemisia tridentata ssp. wyomingensis / Mixed Grasses Shrub Herbaceous Vegetation (CEGL001534)
  Artemisia tridentata ssp. wyomingensis / Pascopyrum smithii Shrub Herbaceous Vegetation (CEGL001047)
  Artemisia tridentata ssp. wyomingensis / Pseudoroegneria spicata Shrub Herbaceous Vegetation (CEGL001535)
- ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUBLAND ALLIANCE (A.832)
  Artemisia tridentata ssp. wyomingensis - Atriplex confertifolia Shrubland (CEGL001040)
  Artemisia tridentata ssp. wyomingensis - Peraphyllum ramosissimum / Festuca idahoensis Shrubland (CEGL001048)
  Artemisia tridentata ssp. wyomingensis - Purshia tridentata / Pseudoroegneria spicata Shrubland (CEGL001050)
  Artemisia tridentata ssp. wyomingensis / Achnatherum hymenoides Shrubland (CEGL001046)
  Artemisia tridentata ssp. wyomingensis / Achnatherum thurberianum Shrubland (CEGL001052)
  Artemisia tridentata ssp. wyomingensis / Balsamorhiza sagittata Shrubland (CEGL000994)
  Artemisia tridentata ssp. wyomingensis / Carex filifolia Shrubland (CEGL001042)
  Artemisia tridentata ssp. wyomingensis / Elymus albicans Shrubland (CEGL001044)
  Artemisia tridentata ssp. wyomingensis / Elymus elymoides Shrubland (CEGL001043)
  Artemisia tridentata ssp. wyomingensis / Hesperostipa comata Shrubland (CEGL001051)
  Artemisia tridentata ssp. wyomingensis / Leymus ambiguus Shrubland (CEGL001045)
  Artemisia tridentata ssp. wyomingensis / Poa secunda Shrubland (CEGL001049)
  Artemisia tridentata ssp. wyomingensis / Pseudoroegneria spicata Shrubland (CEGL001009)
- ATRIPLEX CANESCENS SHRUBLAND ALLIANCE (A.869)
  Artemisia tridentata - Atriplex canescens - Sarcobatus vermiculatus / (Achnatherum hymenoides) Shrubland (CEGL001355)
- EPHEDRA NEVADENSIS SHRUBLAND ALLIANCE (A.857)
  Artemisia tridentata - Ephedra nevadensis Shrubland (CEGL001002)
- EPHEDRA VIRIDIS SHRUBLAND ALLIANCE (A.858)
  Artemisia tridentata - Ephedra viridis Shrubland (CEGL001003)

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- ERICAMERIA NAUSEOSA SHRUBLAND ALLIANCE (A.835)
  Ericameria nauseosa Shrubland [Provisional] (CEGL002713)

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.778 INTER-MOUNTAIN BASINS BIG SAGEBRUSH STEPPE

Division 304,

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This widespread matrix ecological system occurs throughout much of the Columbia Plateau and northern Great Basin and Wyoming, and is found at slightly higher elevations further south. Soils are typically deep and non-saline often with a microphytic crust. This shrub-steppe is dominated by perennial grasses and forbs (>25% cover) with *Artemisia tridentata ssp. tridentata, Artemisia tridentata ssp. xericensis, Artemisia tridentata ssp. wyomingensis, Artemisia tripartita ssp. tripartita*, and/or *Purshia tridentata* dominating or codominating the open to moderately dense (10-40% cover) shrub layer. *Atriplex confertifolia, Chrysothamnus viscidiflorus, Ericameria nauseosa, Tetradymia* spp., or *Artemisia frigida* may be common especially in disturbed stands. Associated graminoids include *Achnatherum hymenoides, Calamagrostis montanensis, Elymus lanceolatus ssp. lanceolatus, Festuca idahoensis, Festuca campestris, Koeleria macrantha, Poa secunda*, and *Pseudoroegneria spicata*. Common forbs are *Phlox hoodii, Arenaria* spp., and *Astragalus* spp. Areas with deeper soils more commonly support *Artemisia tridentata ssp. tridentata* but have largely been converted for other land uses. Microphytic crust is very important in this ecological system. The natural fire regime of this ecological system likely maintains patchy distribution of shrubs so the general aspect of the vegetation is a grassland. Shrubs may increase following heavy grazing and/or with fire suppression, particularly in moist portions in the northern Columbia Plateau where it forms a landscape mosaic pattern with shallow-soil scabland shrublands.

**DISTRIBUTION**

**Range:** Occurs throughout much of the Columbia Plateau and northern Great Basin and Wyoming, and is found at slightly higher elevations further south.
**Ecological Divisions:**

**CONCEPT**

**Alliances and Associations:**

- ARTEMISIA TRIDENTATA (SSP. TRIDENTATA, SSP. XERICENSIS) SHRUB HERBACEOUS ALLIANCE (A.1522)
  Artemisia tridentata (ssp. tridentata, ssp. xericensis) / Pseudoroegneria spicata - Poa secunda Shrub Herbaceous Vegetation (CEGL001019)
  Artemisia tridentata (ssp. tridentata, ssp. xericensis) / Pseudoroegneria spicata Shrub Herbaceous Vegetation (CEGL001018)
- ARTEMISIA TRIDENTATA (SSP. TRIDENTATA, SSP. XERICENSIS) SHRUBLAND ALLIANCE (A.830)
  Artemisia tridentata ssp. tridentata - Grayia spinosa Shrubland (CEGL001004)
  Artemisia tridentata ssp. tridentata / Distichlis spicata Shrubland (CEGL001000)
  Artemisia tridentata ssp. tridentata / Festuca idahoensis Shrubland (CEGL001014)
  Artemisia tridentata ssp. tridentata / Hesperostipa comata Shrubland (CEGL002966)
  Artemisia tridentata ssp. tridentata / Leymus cinereus Shrubland (CEGL001016)
  Artemisia tridentata ssp. tridentata / Pascopyrum smithii - (Elymus lanceolatus) Shrubland (CEGL001017)
  Artemisia tridentata ssp. tridentata / Pleuraphis jamesii Shrubland (CEGL001015)
  Artemisia tridentata ssp. tridentata / Poa secunda Shrubland (CEGL001008)
- ARTEMISIA TRIDENTATA SHRUB HERBACEOUS ALLIANCE (A.1521)
  Artemisia tridentata / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001530)
  Artemisia tridentata / Leymus cinereus Shrub Herbaceous Vegetation (CEGL001458)
- ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUB HERBACEOUS ALLIANCE (A.1527)
  Artemisia tridentata ssp. wyomingensis / Mixed Grasses Shrub Herbaceous Vegetation (CEGL001534)
  Artemisia tridentata ssp. wyomingensis / Pascopyrum smithii Shrub Herbaceous Vegetation (CEGL001047)
  Artemisia tridentata ssp. wyomingensis / Pseudoroegneria spicata Shrub Herbaceous Vegetation (CEGL001535)
- ARTEMISIA TRIPARTITA SSP. TRIPARTITA SHRUB HERBACEOUS ALLIANCE (A.1528)
  Artemisia tripartita ssp. tripartita / Festuca campestris Shrub Herbaceous Vegetation (CEGL001537)
  Artemisia tripartita ssp. tripartita / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001536)
  Artemisia tripartita ssp. tripartita / Hesperostipa comata Shrub Herbaceous Vegetation (CEGL001539)
  Artemisia tripartita ssp. tripartita / Leymus cinereus Shrub Herbaceous Vegetation (CEGL002994)
  Artemisia tripartita ssp. tripartita / Pseudoroegneria spicata Shrub Herbaceous Vegetation (CEGL001538)
- PURSHIA TRIDENTATA SHRUB HERBACEOUS ALLIANCE (A.1523)
  Purshia tridentata / Festuca campestris Shrub Herbaceous Vegetation (CEGL001494)



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Purshia tridentata / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL002674)
Purshia tridentata / Hesperostipa comata Shrub Herbaceous Vegetation (CEGL001498)
Purshia tridentata / Pseudoroegneria spicata Shrub Herbaceous Vegetation (CEGL001495)

- PURSHIA TRIDENTATA SHRUBLAND ALLIANCE (A.825)
  Purshia tridentata / Poa secunda Shrubland (CEGL001059)
- SPOROBOLUS CRYPTANDRUS SHRUB HERBACEOUS ALLIANCE (A.1525)
  Artemisia tridentata / Sporobolus cryptandrus - Achnatherum hymenoides Shrub Herbaceous Vegetation (CEGL001545)

**Dynamics:** The natural fire regime of this ecological system likely maintains patchy distribution of shrubs so the general aspect of the vegetation is a grassland. Shrubs may increase following heavy grazing and/or with fire suppression, particularly in moist portions in the northern Columbia Plateau where it forms a landscape mosaic pattern with shallow-soil scabland shrublands. Microphytic crust is very important in this ecological system.

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.779 INTER-MOUNTAIN BASINS CLIFF AND CANYON

Division 304,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland
**Concept Summary:** This ecological system is found from foothill to subalpine elevations and includes barren and sparsely vegetated landscapes (generally <10% plant cover) of steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock types. Also included are unstable scree and talus slopes that typically occur below cliff faces. Widely scattered trees and shrubs may include *Abies concolor, Pinus edulis, Pinus flexilis, Pinus monophylla, Juniperus* spp., *Artemisia tridentata, Purshia tridentata, Cercocarpus ledifolius, Ephedra* spp., *Holodiscus discolor*, and other species often common in adjacent plant communities.

**DISTRIBUTION**

**Ecological Divisions:**

**CONCEPT**

**Alliances and Associations:**

- CERCOCARPUS INTRICATUS SPARSELY VEGETATED ALLIANCE (A.2543)
  Cercocarpus intricatus Slickrock Sparse Vegetation (CEGL002977)
- CERCOCARPUS MONTANUS SPARSELY VEGETATED ALLIANCE (A.2544)
  Cercocarpus montanus Rock Pavement Sparse Vegetation (CEGL002978)
- CRATAEGUS RIVULARIS TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.2597)
  Crataegus rivularis Shrubland (CEGL002889)
- GLOSSOPETALON SPINESCENS SHRUBLAND ALLIANCE (A.1032)
  Glossopetalon spinescens var. aridum / Pseudoroegneria spicata Shrubland (CEGL001100)
- JUNIPERUS OSTEOSPERMA WOODLAND ALLIANCE (A.536)
  Juniperus osteosperma / Cercocarpus intricatus Woodland (CEGL000733)
- LEYMUS SALINUS SSP. SALMONIS SPARSELY VEGETATED ALLIANCE (A.1258)
  Leymus salinus Shale Sparse Vegetation (CEGL002745)
- PINUS MONOPHYLLA - (JUNIPERUS OSTEOSPERMA) WOODLAND ALLIANCE (A.543)
  Pinus monophylla - Juniperus osteosperma / Sparse Understory Woodland (CEGL000829)
- WOODED BEDROCK SPARSELY VEGETATED ALLIANCE (A.2546)
  Pinus ponderosa Slickrock Sparse Vegetation (CEGL002972)

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.780 INTER-MOUNTAIN BASINS GREASEWOOD FLAT

Division 304,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland, Wetland
**Concept Summary:** This ecological system occurs throughout much of the western U.S. in Intermountain basins and extends onto the western Great Plains. It typically occurs near drainages on stream terraces and flats or may form rings



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around playas. Sites typically have saline soils, a shallow water table and flood intermittently, but remain dry for most growing seasons. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus*. *Atriplex canescens, Atriplex confertifolia*, or *Krascheninnikovia lanata* may be present to codominant. Occurrences are often surrounded by mixed salt desert scrub. The herbaceous layer, if present, is usually dominated by graminoids. There may be inclusions of *Sporobolus airoides, Distichlis spicata* (where water remains ponded the longest), or *Eleocharis palustris* herbaceous types.

### DISTRIBUTION

**Range:** Occurs throughout much of the western U.S. in Intermountain basins and extends onto the western Great Plains.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- DISTICHLIS SPICATA INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1332)
  Distichlis spicata - (Scirpus nevadensis) Herbaceous Vegetation (CEGL001773)
  Distichlis spicata - Lepidium perfoliatum Herbaceous Vegetation (CEGL001772)
  Distichlis spicata Herbaceous Vegetation (CEGL001770)
  Distichlis spicata Mixed Herb Herbaceous Vegetation (CEGL001771)
- ELEOCHARIS PALUSTRIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1422)
  Eleocharis palustris Herbaceous Vegetation (CEGL001833)
- ERICAMERIA NAUSEOSA SHRUBLAND ALLIANCE (A.835)
  Ericameria nauseosa / Sporobolus airoides Shrubland [Provisional] (CEGL002918)
- LEYMUS CINEREUS HERBACEOUS ALLIANCE (A.1204)
  Leymus cinereus Herbaceous Vegetation (CEGL001479)
- LEYMUS CINEREUS INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1329)
  Leymus cinereus - Distichlis spicata Herbaceous Vegetation (CEGL001481)
  Leymus cinereus Bottomland Herbaceous Vegetation (CEGL001480)
- PUCCINELLIA NUTTALLIANA INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1335)
  Puccinellia nuttalliana Herbaceous Vegetation (CEGL001799)
- SALICORNIA RUBRA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1818)
  Salicornia rubra Herbaceous Vegetation (CEGL001999)
- SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SHRUB HERBACEOUS ALLIANCE (A.1554)
  Sarcobatus vermiculatus / Pascopyrum smithii - (Elymus lanceolatus) Shrub Herbaceous Vegetation (CEGL001508)
- SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.1046)
  Sarcobatus vermiculatus - Atriplex parryi / Distichlis spicata Shrubland (CEGL002764)
  Sarcobatus vermiculatus - Psorothamnus polydenius Shrubland (CEGL002763)
  Sarcobatus vermiculatus / Achnatherum hymenoides Shrubland (CEGL001373)
  Sarcobatus vermiculatus / Artemisia tridentata Shrubland (CEGL001359)
  Sarcobatus vermiculatus / Atriplex confertifolia - (Picrothamnus desertorum, Suaeda moquinii) Shrubland (CEGL001371)
  Sarcobatus vermiculatus / Atriplex gardneri Shrubland (CEGL001360)
  Sarcobatus vermiculatus / Distichlis spicata Shrubland (CEGL001363)
  Sarcobatus vermiculatus / Elymus elymoides - Pascopyrum smithii Shrubland (CEGL001365)
  Sarcobatus vermiculatus / Elymus elymoides Shrubland (CEGL001372)
  Sarcobatus vermiculatus / Leymus cinereus Shrubland (CEGL001366)
  Sarcobatus vermiculatus / Nitrophila occidentalis - Suaeda moquinii Shrubland (CEGL001369)
  Sarcobatus vermiculatus / Suaeda moquinii Shrubland (CEGL001370)
  Sarcobatus vermiculatus Shrubland (CEGL001357)
- SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SPARSELY VEGETATED ALLIANCE (A.1877)
  Sarcobatus vermiculatus / Juncus balticus Sparse Vegetation (CEGL002919)
  Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation (CEGL001368)
- SARCOBATUS VERMICULATUS SHRUBLAND ALLIANCE (A.1041)
  Sarcobatus vermiculatus / Bouteloua gracilis Shrubland (CEGL001361)
  Sarcobatus vermiculatus / Pseudoroegneria spicata Shrubland (CEGL001367)
- SPOROBOLUS AIROIDES HERBACEOUS ALLIANCE (A.1267)
  Sporobolus airoides Southern Plains Herbaceous Vegetation (CEGL001685)
- SPOROBOLUS AIROIDES INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1331)
  Sporobolus airoides - Distichlis spicata Herbaceous Vegetation (CEGL001687)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.781 INTER-MOUNTAIN BASINS GREASEWOOD WASH

Division 304,

**Spatial Scale & Pattern:** Linear **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland, Wetland

**Concept Summary:** This barren and sparsely vegetated (generally <10% plant cover) ecological system is restricted to intermittently flooded streambeds lined with *Sarcobatus vermiculatus* and/or *Artemisia cana ssp. cana* in more northern and mesic stands. Shrubs often form a continuous or intermittent linear canopy in and along drainages but do not extend out into flats. Typically it includes patches of saltgrass meadow where water remains for the longest periods. Soils are generally less alkaline than those found in the playa system. Desert scrub species, e.g., *Acacia greggii, Prosopis* spp., that are common in the Mojave, Sonoran and Chihuahuan desert washes, are not present. This type can occur in limited portions of the southwest Great Plains.

**Comments:** Compare with Inter-Mountain Basins Greasewood Flat (CES304.780); should it include nonsparse shrublands?

### DISTRIBUTION

**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- DISTICHLIS SPICATA INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1332)
  Distichlis spicata - (Scirpus nevadensis) Herbaceous Vegetation (CEGL001773)
  Distichlis spicata - Lepidium perfoliatum Herbaceous Vegetation (CEGL001772)
  Distichlis spicata Herbaceous Vegetation (CEGL001770)
  Distichlis spicata Mixed Herb Herbaceous Vegetation (CEGL001771)
- HORDEUM BRACHYANTHERUM TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.2585)
  Hordeum brachyantherum Herbaceous Vegetation (CEGL003430)
- SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SHRUB HERBACEOUS ALLIANCE (A.1554)
  Sarcobatus vermiculatus / Pascopyrum smithii - (Elymus lanceolatus) Shrub Herbaceous Vegetation (CEGL001508)
- SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.1046)
  Sarcobatus vermiculatus - Atriplex parryi / Distichlis spicata Shrubland (CEGL002764)
  Sarcobatus vermiculatus - Psorothamnus polydenius Shrubland (CEGL002763)
  Sarcobatus vermiculatus / Achnatherum hymenoides Shrubland (CEGL001373)
  Sarcobatus vermiculatus / Atriplex confertifolia - (Picrothamnus desertorum, Suaeda moquinii) Shrubland (CEGL001371)
  Sarcobatus vermiculatus / Atriplex gardneri Shrubland (CEGL001360)
  Sarcobatus vermiculatus / Distichlis spicata Shrubland (CEGL001363)
  Sarcobatus vermiculatus / Elymus elymoides - Pascopyrum smithii Shrubland (CEGL001365)
  Sarcobatus vermiculatus / Elymus elymoides Shrubland (CEGL001372)
  Sarcobatus vermiculatus / Ericameria nauseosa Shrubland (CEGL001362)
  Sarcobatus vermiculatus / Leymus cinereus Shrubland (CEGL001366)
  Sarcobatus vermiculatus / Nitrophila occidentalis - Suaeda moquinii Shrubland (CEGL001369)
  Sarcobatus vermiculatus / Suaeda moquinii Shrubland (CEGL001370)
  Sarcobatus vermiculatus Shrubland (CEGL001357)
- SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SPARSELY VEGETATED ALLIANCE (A.1877)
  Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation (CEGL001368)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**

**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

## CES304.782 INTER-MOUNTAIN BASINS JUNIPER SAVANNA

Division 304,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland

**Concept Summary:** This widespread ecological system occupies dry foothills and sandsheets of western Colorado, central Utah, west into the Great Basin of Nevada and southern Idaho. It is typically found at lower elevations ranging from 1500-2300 m. This system is generally found at lower elevations and more xeric sites than Great Basin Pinyon-Juniper Woodland (CES304.773) or Colorado Plateau Pinyon-Juniper Woodland (CES304.767). These occurrences are found on lower mountain slopes and plateaus, often on dry, rocky areas. The vegetation is typically open savanna, although there may be inclusions of more dense juniper woodlands. This savanna is dominated by *Juniperus osteosperma* trees with high cover of perennial bunch grasses and forbs, with *Bouteloua gracilis* and *Pleuraphis jamesii* being most common. Species of *Artemisia*



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are also commonly present. Pinyon trees are typically not present because sites are outside the ecological or geographic range of *Pinus edulis* and *Pinus monophylla*.

### DISTRIBUTION

**Range:** Western Colorado, central Utah, west into the Great Basin of Nevada and southern Idaho at lower elevations, ranging from 1500-2300 m.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- JUNIPERUS OSTEOSPERMA WOODED HERBACEOUS ALLIANCE (A.1502)
  Juniperus osteosperma / Hesperostipa comata Wooded Herbaceous Vegetation (CEGL001489)
  Juniperus osteosperma / Leymus salinus ssp. salmonis Wooded Herbaceous Vegetation (CEGL001488)
- JUNIPERUS OSTEOSPERMA WOODLAND ALLIANCE (A.536)
  Juniperus osteosperma / Hesperostipa neomexicana Woodland (CEGL000740)
  Juniperus osteosperma / Pleuraphis mutica Woodland (CEGL000736)
  Juniperus osteosperma / Pseudoroegneria spicata Woodland (CEGL000738)
  Juniperus osteosperma / Symphoricarpos oreophilus Woodland (CEGL000741)
- JUNIPERUS SCOPULORUM WOODLAND ALLIANCE (A.506)
  Juniperus scopulorum / Pseudoroegneria spicata Woodland (CEGL000748)
  Juniperus scopulorum / Schizachyrium scoparium Woodland (CEGL000750)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.784 INTER-MOUNTAIN BASINS MIXED SALT DESERT SCRUB

Division 304,

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This extensive ecological system includes open-canopied shrublands of typically saline desert basins, alluvial slopes and plains across the Intermountain western U.S. This type also extends in limited distribution into the southern Great Plains. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils, but include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more *Atriplex* species such as *Atriplex confertifolia, Atriplex canescens, Atriplex polycarpa*, or *Atriplex spinifera*. Other shrubs present to codominate may include *Artemisia tridentata ssp. wyomingensis, Chrysothamnus viscidiflorus, Ericameria nauseosa, Ephedra nevadensis, Grayia spinosa, Krascheninnikovia lanata, Lycium* spp., *Picrothamnus desertorum*, or *Tetradymia* spp. *Sarcobatus vermiculatus* is generally absent, but if present does not codominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids such as *Achnatherum hymenoides, Bouteloua gracilis, Elymus lanceolatus ssp. lanceolatus, Pascopyrum smithii, Pleuraphis jamesii, Pleuraphis rigida, Poa secunda*, or *Sporobolus airoides*. Various forbs are also present.

### DISTRIBUTION

**Range:** Intermountain western U.S., extending in limited distribution into the southern Great Plains.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ATRIPLEX (LENTIFORMIS, POLYCARPA) SHRUBLAND ALLIANCE (A.864)
  Atriplex (lentiformis, polycarpa) Shrubland [Placeholder] (CEGL003016)
- ATRIPLEX CANESCENS SHRUBLAND ALLIANCE (A.869)
  Atriplex canescens - Artemisia tridentata Shrubland (CEGL001282)
  Atriplex canescens - Ephedra viridis Shrubland (CEGL001287)
  Atriplex canescens - Krascheninnikovia lanata Shrubland (CEGL001285)
  Atriplex canescens / Achnatherum hymenoides Shrubland (CEGL001289)
  Atriplex canescens / Bouteloua gracilis Shrubland (CEGL001283)
  Atriplex canescens / Calycoseris parryi Shrubland (CEGL001284)
  Atriplex canescens / Parthenium confertum Shrubland (CEGL001290)
  Atriplex canescens / Pleuraphis jamesii Shrubland (CEGL001288)
  Atriplex canescens / Purshia stansburiana Shrubland (CEGL001286)
  Atriplex canescens / Sporobolus airoides Shrubland (CEGL001291)



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Atriplex canescens / Sporobolus wrightii Shrubland (CEGL001292)
Atriplex canescens Shrubland (CEGL001281)

- ATRIPLEX CONFERTIFOLIA SHRUBLAND ALLIANCE (A.870)
  Atriplex confertifolia - Ephedra nevadensis Shrubland (CEGL001303)
  Atriplex confertifolia - Krascheninnikovia lanata Shrubland (CEGL001301)
  Atriplex confertifolia - Lycium andersonii Shrubland (CEGL001308)
  Atriplex confertifolia - Lycium pallidum / Mirabilis pudica Shrubland (CEGL001309)
  Atriplex confertifolia - Lycium shockleyi Shrubland (CEGL001310)
  Atriplex confertifolia - Picrothamnus desertorum / Achnatherum hymenoides Shrubland (CEGL001297)
  Atriplex confertifolia - Picrothamnus desertorum / Krascheninnikovia lanata Shrubland (CEGL001296)
  Atriplex confertifolia - Picrothamnus desertorum / Sarcobatus vermiculatus Shrubland (CEGL001298)
  Atriplex confertifolia - Picrothamnus desertorum Shrubland (CEGL001295)
  Atriplex confertifolia - Sarcobatus vermiculatus Shrubland (CEGL001313)
  Atriplex confertifolia / Achnatherum hymenoides Shrubland (CEGL001311)
  Atriplex confertifolia / Elymus elymoides Shrubland (CEGL001302)
  Atriplex confertifolia / Ericameria nauseosa Shrubland (CEGL001300)
  Atriplex confertifolia / Hesperostipa comata Shrubland (CEGL001314)
  Atriplex confertifolia / Kochia americana Shrubland (CEGL001305)
  Atriplex confertifolia / Leymus salinus Shrubland (CEGL001307)
  Atriplex confertifolia / Leymus salinus ssp. salmonis Shrubland (CEGL001306)
  Atriplex confertifolia / Pleuraphis jamesii Shrubland (CEGL001304)
  Atriplex confertifolia / Pseudoroegneria spicata Shrubland (CEGL001312)
  Atriplex confertifolia / Tetradymia glabrata Shrubland (CEGL001315)
  Atriplex confertifolia Great Basin Shrubland (CEGL001294)
  Atriplex confertifolia Wyoming Basins Shrubland (CEGL001293)
- ATRIPLEX OBOVATA DWARF-SHRUBLAND ALLIANCE (A.1108)
  Atriplex obovata / Sporobolus airoides - Sporobolus cryptandrus Dwarf-shrubland (CEGL001447)
  Atriplex obovata / Tidestromia carnosa Dwarf-shrubland (CEGL004575)
- ATRIPLEX PARRYI SHRUBLAND ALLIANCE (A.2507)
  Atriplex parryi Shrubland [Placeholder] (CEGL002711)
- ATRIPLEX POLYCARPA SHRUBLAND ALLIANCE (A.873)
  Atriplex polycarpa / Pleuraphis mutica Shrubland (CEGL001319)
  Atriplex polycarpa Shrubland (CEGL001318)
- ATRIPLEX SPINIFERA SHRUBLAND ALLIANCE (A.865)
  Atriplex spinifera Shrubland [Placeholder] (CEGL003015)
- KRASCHENINNIKOVIA LANATA DWARF-SHRUBLAND ALLIANCE (A.1104)
  Krascheninnikovia lanata / Achnatherum hymenoides Dwarf-shrubland (CEGL001323)
  Krascheninnikovia lanata / Hesperostipa comata Dwarf-shrubland (CEGL001327)
  Krascheninnikovia lanata Dwarf-shrubland [Provisional] (CEGL001320)
- PICROTHAMNUS DESERTORUM SHRUBLAND ALLIANCE (A.1128)
  Picrothamnus desertorum / Elymus elymoides Shrubland [Provisional] (CEGL002992)
  Picrothamnus desertorum Shrubland (CEGL001452)
- PLEURAPHIS JAMESII SHRUB HERBACEOUS ALLIANCE (A.1532)
  Atriplex obovata / Pleuraphis jamesii - Sporobolus airoides Shrub Herbaceous Vegetation (CEGL001775)

**Environment:** This salt-desert shrubland system is a matrix system in the Intermountain West. This system is comprised of arid to semi-arid shrublands on lowland and upland sites usually at elevations between 1520 and 2200 m (4987-7218 feet). Sites can be found on all aspects and include valley bottoms, alluvial and alkaline flats, mesas and plateaus, playas, drainage terraces, washes and interdune basins, bluffs, and gentle to moderately steep sandy or rocky slopes. Slopes are typically gentle to moderately steep, but are sometimes unstable and prone to surface movement. Many areas within this system are degraded due to erosion and may resemble "badlands." Soil surface is often very barren in occurrences of this system. The interspaces between the characteristic plant clusters are commonly covered by a microphytic crust (West 1982).

This is typically a system of extreme climatic conditions, with warm to hot summers and freezing winters. Annual precipitation ranges from approximately 13-33 cm. In much of the ecological system, the period of greatest moisture will be mid- to late summer, although in the more northern areas a moist period is to be expected in the cold part of the year. However, plotted seasonality of occurrence is probably of less importance on this desert system than in other ecosystems because desert precipitation comes with an extreme irregularity that does not appear in graphs of long-term seasonal or monthly averages (Blaisdell and Holmgren 1984). Soils are shallow to moderately deep, poorly developed, and a product of an arid climate and little precipitation. Soils are often alkaline or saline. Vegetation within this system is tolerant of these soil conditions but not restricted to it. The shallow soils of much of the area are poorly developed Entisols. Vegetation within this system can occur on level pediment remnants where coarse-textured and well-developed soil profiles have been derived from sandstone gravel and are alkaline, or on Mancos shale badlands, where soil profiles are typically fine-textured and non-



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alkaline throughout (West and Ibrahim 1968). They can also occur in alluvial basins where parent materials from the other habitats have been deposited over Mancos shale and the soils are heavy-textured and saline-alkaline throughout the profile (West and Ibrahim 1968).

**Vegetation:** Occurrences of this ecological system vary from almost pure occurrences of single species to fairly complex mixtures. The characteristic mix of low shrubs and grasses is sparse, with large open spaces between the plants (Blaisdell and Holmgren 1984). Occurrences have a sparse to moderately dense cover of woody species that is dominated by *Atriplex canescens* (may codominate with *Artemisia tridentata*), *Atriplex confertifolia* (may codominate with *Lycium andersonii*), *Atriplex obovata, Picrothamnus desertorum*, or *Krascheninnikovia lanata*. Other shrubs that may occur within these occurrences include *Purshia stansburiana, Psorothamnus polydenius, Ephedra* spp., *Acacia greggii, Encelia frutescens, Tiquilia latior, Parthenium confertum, Atriplex polycarpa, Atriplex lentiformis, Atriplex spinifera, Picrothamnus desertorum (= Artemisia spinescens), Frankenia salina, Artemisia frigida, Chrysothamnus* spp., *Lycium* ssp., *Suaeda* spp., *Yucca glauca*, and *Tetradymia spinosa*. Dwarf-shrubs include *Gutierrezia sarothrae* and *Eriogonum* spp. Warm-season medium-tall and short perennial grasses dominate in the sparse to moderately dense graminoid layer. The species present depend on the geographic range of the grasses, alkalinity/salinity and past land use. Species may include *Pleuraphis jamesii, Bouteloua gracilis, Sporobolus airoides, Sporobolus cryptandrus, Achnatherum hymenoides, Elymus elymoides, Distichlis spicata, Leymus salinus, Pascopyrum smithii, Hesperostipa comata, Pseudoroegneria spicata, Poa secunda, Leymus ambiguus*, and *Muhlenbergia torreyi*. A number of annual species may also grow in association with the shrubs and grasses of this system, although they are usually rare and confined to areas of recent disturbance (Blaisdell and Holmgren 1984). Forb cover is generally sparse. Perennial forbs that might occur include *Sphaeralcea coccinea, Chaetopappa ericoides, Xylorhiza venusta, Descurainia sophia*, and *Mentzelia* species. Annual natives include *Plantago* spp., *Vulpia octoflora*, or *Monolepis nuttalliana*. Associated halophytic annuals include *Salicornia rubra, Salicornia bigelovii*, and *Suaeda* species. Exotic annuals that may occur include *Salsola kali, Bromus rubens*, and *Bromus tectorum*. Cacti like *Opuntia* spp. and *Echinocereus* spp. may be present in some occurrences. Trees are not usually present but some scattered *Juniperus* spp. may be found.

**Dynamics:** West (1982) stated that "salt desert shrub vegetation occurs mostly in two kinds of situations that promote soil salinity, alkalinity, or both. These are either at the bottom of drainages in enclosed basins or where marine shales outcrop." However, salt-desert shrub vegetation may be an indication of climatically dry as well as physiologically dry soils (Blaisdell and Holmgren 1984). Not all salt-desert shrub soils are salty, and their hydrologic characteristics may often be responsible for the associated vegetation (Naphan 1966). Species of the salt-desert shrub complex have different degrees of tolerance to salinity and aridity, and they tend to sort themselves out along a moisture/salinity gradient (West 1982). Species and communities are apparently sorted out along physical, chemical, moisture, and topographic gradients through complex relations that are not understood and are in need of further study (Blaisdell and Holmgren 1984).

The winter months within this system are a good time for soil moisture accumulation and storage. There is generally at least one good snow storm per season that will provide sufficient moisture to the vegetation. The winter moisture accumulation amounts will affect spring plant growth. Plants may grow as little as a few inches to 1 m. Unless more rains come in the spring, the soil moisture will be depleted in a few weeks, growth will slow and ultimately cease, and the perennial plants will assume their various forms of dormancy (Blaisdell and Holmgren 1984). If effective rain comes later in the warm season, some of the species will renew their growth from the stage at which it had stopped. Others, having died back, will start over as if emerging from winter dormancy (Blaisdell and Holmgren 1984). *Atriplex confertifolia* shrubs often develop large leaves in the spring, which increase the rate of photosynthesis. As soil moisture decreases, the leaves are lost, and the plant takes on a dead appearance. During late fall, very small overwintering leaves appear which provide some photosynthetic capability through the remainder of the year (IVC 1999). Other communities are maintained by intra- or inter-annual cycles of flooding followed by extended drought, which favor accumulation of transported salts. The moisture supporting these intermittently flooded wetlands is usually derived off-site, and they are dependent upon natural watershed function for persistence (Reid et al. 1999).

In summary, desert communities of perennial plants are dynamic and changing. The composition within this system may change dramatically and may be both cyclic and unidirectional. Superimposed on the compositional change is great variation from year to year in growth of all the vegetation – the sum of varying growth responses of individual species to specific conditions of different years (Blaisdell and Holmgren 1984). Desert plants grow when temperature is satisfactory, but only if soil moisture is available at the same time. Because amount of moisture is variable from year to year and because different species flourish under different seasons of soil moisture, seldom do all components of the vegetation thrive in the same year (Blaisdell and Holmgren 1984).

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS



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## CES304.785 INTER-MOUNTAIN BASINS MONTANE SAGEBRUSH STEPPE

Division 304,

**Spatial Scale & Pattern:** Matrix **Classification Confidence:** medium

**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland

**Concept Summary:** This ecological system includes sagebrush communities occurring at montane and subalpine elevations across the western U.S. from 1000 m in eastern Oregon and Washington to over 3000 m in the southern Rockies. Climate is cool, semi-arid to subhumid. This system primarily occurs on deep-soiled to stony flats, ridges, nearly flat ridgetops, and mountain slopes. In general this system shows an affinity for mild topography, fine soils, and some source of subsurface moisture. It is composed primarily of mountain sagebrush (*Artemisia tridentata ssp. vaseyana*) and related taxa such as *Artemisia tridentata ssp. spiciformis (= Artemisia spiciformis)*, non-riparian *Artemisia cana ssp. viscidula*, and *Artemisia arbuscula ssp. arbuscula*. *Purshia tridentata* may codominate or even dominate some stands. Other common shrubs include *Symphoricarpos* spp., *Amelanchier* spp., *Ericameria nauseosa, Peraphyllum ramosissimum, Ribes cereum*, and *Chrysothamnus viscidiflorus*. Most stands have an abundant perennial herbaceous layer (over 25% cover), but this system also includes *Artemisia tridentata ssp. vaseyana* shrublands. Common graminoids include *Festuca arizonica, Festuca idahoensis, Hesperostipa comata, Poa fendleriana, Elymus trachycaulus, Bromus carinatus, Poa secunda, Leucopoa kingii, Deschampsia caespitosa*, and *Pseudoroegneria spicata*. Frequent wildfire maintains an open herbaceous-rich steppe condition.

### DISTRIBUTION

**Range:** Montane and subalpine elevations across the western U.S. from 1000 m in eastern Oregon and Washington to over 3000 m in the southern Rockies.

**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ARTEMISIA ARBUSCULA SSP. ARBUSCULA SHRUB HERBACEOUS ALLIANCE (A.1566)
  Artemisia arbuscula ssp. arbuscula - Purshia tridentata / Pseudoroegneria spicata - Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001518)
  Artemisia arbuscula ssp. arbuscula / Achnatherum thurberianum Shrub Herbaceous Vegetation (CEGL001413)
  Artemisia arbuscula ssp. arbuscula / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001409)
  Artemisia arbuscula ssp. arbuscula / Leymus salinus ssp. salmonis Shrub Herbaceous Vegetation (CEGL001410)
  Artemisia arbuscula ssp. arbuscula / Poa secunda Shrub Herbaceous Vegetation (CEGL001411)
  Artemisia arbuscula ssp. arbuscula / Pseudoroegneria spicata Shrub Herbaceous Vegetation (CEGL001412)
- ARTEMISIA ARBUSCULA SSP. ARBUSCULA SHRUBLAND ALLIANCE (A.2547)
  Artemisia arbuscula ssp. arbuscula - Artemisia tridentata ssp. vaseyana / Festuca idahoensis Shrubland [Provisional] (CEGL002982)
- ARTEMISIA ARBUSCULA SSP. THERMOPOLA SHRUB HERBACEOUS ALLIANCE (A.2553)
  Artemisia arbuscula ssp. thermopola / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001519)
- ARTEMISIA CANA (SSP. BOLANDERI, SSP. VISCIDULA) SHRUB HERBACEOUS ALLIANCE (A.1531)
  Artemisia cana (ssp. bolanderi, ssp. viscidula) - Artemisia tridentata ssp. vaseyana / Poa cusickii Shrub Herbaceous Vegetation [Provisional] (CEGL001549)
  Artemisia cana (ssp. bolanderi, ssp. viscidula) / Poa fendleriana ssp. fendleriana Shrub Herbaceous Vegetation (CEGL001551)
  Artemisia cana ssp. bolanderi / Muhlenbergia richardsonis Shrub Herbaceous Vegetation (CEGL001743)
  Artemisia cana ssp. viscidula / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001552)
- ARTEMISIA CANA (SSP. BOLANDERI, SSP. VISCIDULA) SHRUBLAND ALLIANCE (A.2557)
  Artemisia cana (ssp. bolanderi, ssp. viscidula) / Leymus cinereus Shrubland (CEGL001460)
  Artemisia cana (ssp. bolanderi, ssp. viscidula) / Poa pratensis Semi-natural Shrubland (CEGL002988)
  Artemisia cana (ssp. bolanderi, ssp. viscidula) / Poa secunda Shrubland (CEGL001548)
  Artemisia cana ssp. bolanderi / Eleocharis palustris Shrubland (CEGL002987)
  Artemisia cana ssp. viscidula - (Salix spp.) / Festuca idahoensis Shrubland (CEGL001075)
  Artemisia cana ssp. viscidula / Deschampsia caespitosa Shrubland (CEGL001074)
  Artemisia cana ssp. viscidula / Festuca ovina Shrubland (CEGL001076)
  Artemisia cana ssp. viscidula / Festuca thurberi Shrubland (CEGL001071)
  Artemisia cana ssp. viscidula / Purshia tridentata Shrubland (CEGL001073)
- ARTEMISIA TRIDENTATA SHRUB HERBACEOUS ALLIANCE (A.1521)
  Artemisia tridentata / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001530)
- ARTEMISIA TRIDENTATA SHRUBLAND ALLIANCE (A.829)
  Artemisia tridentata Upperzone Community Shrubland (CEGL001013)
- ARTEMISIA TRIDENTATA SSP. SPICIFORMIS SHRUB HERBACEOUS ALLIANCE (A.2555)
  Artemisia tridentata ssp. spiciformis Shrub Herbaceous Vegetation [Provisional] (CEGL002993)



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- ARTEMISIA TRIDENTATA SSP. SPICIFORMIS SHRUBLAND ALLIANCE (A.2550)
  Artemisia tridentata ssp. spiciformis / Bromus carinatus Shrubland (CEGL002989)
  Artemisia tridentata ssp. spiciformis / Carex geyeri Shrubland (CEGL002990)
- ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUB HERBACEOUS ALLIANCE (A.1526)
  Artemisia tridentata ssp. vaseyana / Carex geyeri Shrub Herbaceous Vegetation (CEGL001532)
  Artemisia tridentata ssp. vaseyana / Festuca campestris Shrub Herbaceous Vegetation (CEGL001531)
  Artemisia tridentata ssp. vaseyana / Festuca idahoensis Shrub Herbaceous Vegetation (CEGL001533)
- ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE (A.831)
  Artemisia tridentata ssp. vaseyana - Purshia tridentata / Pseudoroegneria spicata Shrubland (CEGL001032)
  Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Bromus carinatus Shrubland (CEGL001035)
  Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Elymus trachycaulus ssp. trachycaulus Shrubland (CEGL001034)
  Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Festuca idahoensis Shrubland (CEGL001036)
  Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Hesperostipa comata Shrubland (CEGL001039)
  Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Poa secunda Shrubland (CEGL001037)
  Artemisia tridentata ssp. vaseyana - Symphoricarpos oreophilus / Pseudoroegneria spicata Shrubland (CEGL001038)
  Artemisia tridentata ssp. vaseyana / Achnatherum occidentale Shrubland (CEGL001033)
  Artemisia tridentata ssp. vaseyana / Balsamorhiza sagittata Shrubland (CEGL001020)
  Artemisia tridentata ssp. vaseyana / Bromus carinatus Shrubland (CEGL001021)
  Artemisia tridentata ssp. vaseyana / Carex exserta Shrubland (CEGL008651)
  Artemisia tridentata ssp. vaseyana / Festuca idahoensis - Bromus carinatus Shrubland (CEGL001023)
  Artemisia tridentata ssp. vaseyana / Festuca thurberi Shrubland (CEGL001024)
  Artemisia tridentata ssp. vaseyana / Hesperostipa comata Shrubland (CEGL002931)
  Artemisia tridentata ssp. vaseyana / Leucopoa kingii - Koeleria macrantha Shrubland (CEGL001026)
  Artemisia tridentata ssp. vaseyana / Leucopoa kingii Shrubland (CEGL001025)
  Artemisia tridentata ssp. vaseyana / Leymus cinereus Shrubland (CEGL001027)
  Artemisia tridentata ssp. vaseyana / Pascopyrum smithii Shrubland (CEGL001028)
  Artemisia tridentata ssp. vaseyana / Phlox condensata Shrubland (CEGL002770)
  Artemisia tridentata ssp. vaseyana / Poa secunda Shrubland (CEGL001029)
  Artemisia tridentata ssp. vaseyana / Pseudoroegneria spicata - Poa fendleriana Shrubland (CEGL001031)
  Artemisia tridentata ssp. vaseyana / Pseudoroegneria spicata Shrubland (CEGL001030)
- ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUBLAND ALLIANCE (A.832)
  Artemisia tridentata ssp. wyomingensis - Peraphyllum ramosissimum / Festuca idahoensis Shrubland (CEGL001048)
- SYMPHORICARPOS OREOPHILUS SHRUBLAND ALLIANCE (A.2530)
  Symphoricarpos oreophilus / Poa pratensis Semi-natural Shrubland [Provisional] (CEGL002951)

**Environment:** This ecological system occurs in many of the western United States, usually at middle elevations (1000-2500 m). The climate regime is cool, semi-arid to subhumid, with yearly precipitation ranging from 25 to 90 cm/year. Much of this precipitation falls as snow. Temperatures are continental with large annual and diurnal variation. In general this system shows an affinity for mild topography, fine soils, and some source of subsurface moisture. Soils generally are moderately deep to deep, well-drained, and of loam, sandy loam, clay loam, or gravelly loam textural classes; soils often have a substantial volume of coarse fragments, and are derived from a variety of parent materials. This system primarily occurs on deep-soiled to stony flats, ridges, nearly flat ridgetops, and mountain slopes. All aspects are represented, but the higher elevation occurrences may be restricted to south- or west-facing slopes.

**Vegetation:** Vegetation types within this ecological system are usually less than 1.5 m tall and dominated by *Artemisia tridentata ssp. vaseyana, Artemisia cana ssp. viscidula*, or *Artemisia tridentata ssp. spiciformis*. A variety of other shrubs can be found in some occurrences, but these are seldom dominant. They include *Artemisia rigida, Artemisia arbuscula, Ericameria nauseosa, Chrysothamnus viscidiflorus, Symphoricarpos oreophilus, Purshia tridentata, Peraphyllum ramosissimum, Ribes cereum, Rosa woodsii, Ceanothus velutinus*, and *Amelanchier alnifolia*. The canopy cover is usually between 20-80%. The herbaceous layer is usually well represented, but bare ground may be common in particularly arid or disturbed occurrences. Graminoids that can be abundant include *Festuca idahoensis, Festuca thurberi, Festuca ovina, Elymus elymoides, Deschampsia caespitosa, Danthonia intermedia, Danthonia parryi, Stipa* spp., *Pascopyrum smithii, Bromus carinatus, Elymus trachycaulus, Koeleria macrantha, Pseudoroegneria spicata, Poa fendleriana*, or *Poa secunda*, and *Carex* spp. Forbs are often numerous and an important indicator of health. Forb species may include *Castilleja, Potentilla, Erigeron, Phlox, Astragalus, Geum, Lupinus*, and *Eriogonum, Balsamorhiza sagittata, Achillea millefolium, Antennaria rosea*, and *Eriogonum umbellatum, Fragaria virginiana, Artemisia ludoviciana, Hymenoxys hoopesii (= Helenium hoopesii)*, etc.

**Dynamics:** Healthy sagebrush shrublands are very productive, are often grazed by domestic livestock, and are strongly preferred during the growing season (Padgett et al. 1989). Prolonged livestock use can cause a decrease in the abundance of native bunch grasses and increase in the cover of shrubs and non-native grass species, such as *Poa pratensis*. *Artemisia cana* resprouts vigorously following spring fire, and prescribed burning may increase shrub cover. Conversely, fire in the fall may decrease shrub abundance (Hansen et al. 1995). *Artemisia tridentata* is generally killed by fires and may take over ten years



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to form occurrences of some 20% cover or more. The condition of most sagebrush steppe has been degraded due to fire suppression and heavy livestock grazing. It is unclear how long restoration will take to restore degraded occurrences.

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.772 INTER-MOUNTAIN BASINS MOUNTAIN MAHOGANY WOODLAND AND SHRUBLAND

Division 304,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This ecological system occurs in hills and mountain ranges of the Intermountain basins from the eastern foothills of the Sierra Nevada northeast to the foothills of the Big Horn Mountains. It typically occurs from 600 m to over 2650 m in elevation on rocky outcrops or escarpments and forms small- to large-patch stands in forested areas. Most stands occur as shrublands on ridges and steep rimrock slopes, but it may occur as a small tree in steppe areas. This system includes both woodlands and shrublands dominated by *Cercocarpus ledifolius*. *Artemisia tridentata ssp. vaseyana, Purshia tridentata*, with species of *Arctostaphylos, Ribes*, or *Symphoricarpos* are often present. Scattered junipers or pines may also occur. *Cercocarpus ledifolius* is a slow-growing, drought-tolerant species that generally does not resprout after burning and needs the protection from fire that rocky sites provide.

**DISTRIBUTION**

**Range:** Occurs in hills and mountain ranges of the Intermountain basins from the eastern foothills of the Sierra Nevada northeast to the foothills of the Big Horn Mountains.
**Ecological Divisions:**

**CONCEPT**

**Alliances and Associations:**

- CERCOCARPUS LEDIFOLIUS SHRUBLAND ALLIANCE (A.828)
  Artemisia arbuscula - Cercocarpus ledifolius / Pseudoroegneria spicata - Poa secunda Shrubland (CEGL001487)
  Cercocarpus ledifolius / Mahonia repens Shrubland (CEGL000965)
  Cercocarpus ledifolius / Prunus virginiana Shrubland (CEGL000966)
  Cercocarpus ledifolius / Pseudoroegneria spicata Shrubland (CEGL000967)
  Cercocarpus ledifolius / Symphoricarpos longiflorus Shrubland (CEGL000969)
- CERCOCARPUS LEDIFOLIUS WOODLAND ALLIANCE (A.586)
  Cercocarpus ledifolius / Artemisia tridentata ssp. vaseyana Woodland (CEGL001022)
  Cercocarpus ledifolius / Artemisia tridentata Woodland (CEGL000960)
  Cercocarpus ledifolius / Calamagrostis rubescens Woodland (CEGL000961)
  Cercocarpus ledifolius / Festuca idahoensis Woodland (CEGL000962)
  Cercocarpus ledifolius / Holodiscus dumosus Woodland (CEGL000963)
  Cercocarpus ledifolius / Leymus salinus ssp. salmonis Woodland (CEGL000964)
  Cercocarpus ledifolius / Pseudoroegneria spicata - Festuca idahoensis Woodland (CEGL000968)
  Cercocarpus ledifolius / Symphoricarpos oreophilus Woodland (CEGL000970)
  Cercocarpus ledifolius Woodland [Placeholder] (CEGL003038)

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.786 INTER-MOUNTAIN BASINS PLAYA

Division 304,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland, Wetland
**Concept Summary:** This ecological system is composed of barren and sparsely vegetated playas (generally<10% plant cover) found in the Intermountain western U.S. Salt crusts are common throughout, with small saltgrass beds in depressions and sparse shrubs around the margins. These systems are intermittently flooded. The water is prevented from percolating through the soil by an impermeable soil sub-horizon and is left to evaporate. Soil salinity varies greatly with soil moisture and greatly affects species composition. Characteristic species may include *Allenrolfea occidentalis, Sarcobatus vermiculatus, Grayia spinosa, Puccinellia lemmonii, Leymus cinereus, Distichlis spicata*, and/or *Atriplex* spp.



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**Comments:** Need to incorporate material from Oregon and Idaho, Wyoming? See Jimmy's Columbia Plateau systems list for associations of playas.

### DISTRIBUTION

**Range:** Intermountain western U.S.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- (SARCOCORNIA UTAHENSIS) - (ARTHROCNEMUM SUBTERMINALE) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1676)
  (Sarcocornia utahensis) - (Arthrocnemum subterminale) Seasonally Flooded Herbaceous Vegetation [Placeholder] (CEGL003120)
- ALLENROLFEA OCCIDENTALIS SHRUBLAND ALLIANCE (A.866)
  Allenrolfea occidentalis / Atriplex gardneri Shrubland (CEGL000989)
  Allenrolfea occidentalis Shrubland (CEGL000988)
- ARTEMISIA PAPPOSA SHRUBLAND ALLIANCE (A.2551)
  Artemisia papposa / Danthonia californica - Festuca idahoensis Shrubland (CEGL002991)
- ATRIPLEX SPINIFERA SHRUBLAND ALLIANCE (A.865)
  Atriplex spinifera Shrubland [Placeholder] (CEGL003015)
- CHRYSOTHAMNUS ALBIDUS SHRUBLAND ALLIANCE (A.834)
  Chrysothamnus albidus / Puccinellia nuttalliana Shrubland (CEGL001328)
- DISTICHLIS SPICATA INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1332)
  Distichlis spicata - (Scirpus nevadensis) Herbaceous Vegetation (CEGL001773)
  Distichlis spicata - Lepidium perfoliatum Herbaceous Vegetation (CEGL001772)
  Distichlis spicata Herbaceous Vegetation (CEGL001770)
  Distichlis spicata Mixed Herb Herbaceous Vegetation (CEGL001771)
- GRAYIA SPINOSA SHRUBLAND ALLIANCE (A.1038)
  Grayia spinosa / Achnatherum hymenoides Shrubland (CEGL001350)
  Grayia spinosa / Achnatherum thurberianum Shrubland (CEGL002681)
- HORDEUM JUBATUM TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1358)
  Hordeum jubatum Herbaceous Vegetation (CEGL001798)
- KRASCHENINNIKOVIA LANATA DWARF-SHRUBLAND ALLIANCE (A.1104)
  Krascheninnikovia lanata / Poa secunda Dwarf-shrubland (CEGL001326)
- LEYMUS CINEREUS HERBACEOUS ALLIANCE (A.1204)
  Leymus cinereus - Pascopyrum smithii Herbaceous Vegetation (CEGL001483)
- LEYMUS CINEREUS INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1329)
  Leymus cinereus - Distichlis spicata Herbaceous Vegetation (CEGL001481)
  Leymus cinereus Bottomland Herbaceous Vegetation (CEGL001480)
- LEYMUS TRITICOIDES TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1353)
  Leymus triticoides - Carex spp. Herbaceous Vegetation (CEGL001571)
  Leymus triticoides - Poa secunda Herbaceous Vegetation (CEGL001572)
- PLUCHEA SERICEA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.798)
  Pluchea sericea Seasonally Flooded Shrubland [Placeholder] (CEGL003080)
- POA SECUNDA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1410)
  Poa secunda - Muhlenbergia richardsonis Herbaceous Vegetation (CEGL002755)
  Puccinellia lemmonii - Poa secunda Seasonally Flooded Herbaceous Vegetation (CEGL001658)
- SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SHRUB HERBACEOUS ALLIANCE (A.1554)
  Sarcobatus vermiculatus / Pascopyrum smithii - (Elymus lanceolatus) Shrub Herbaceous Vegetation (CEGL001508)
- SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.1046)
  Sarcobatus vermiculatus - Atriplex parryi / Distichlis spicata Shrubland (CEGL002764)
  Sarcobatus vermiculatus - Psorothamnus polydenius Shrubland (CEGL002763)
  Sarcobatus vermiculatus / Achnatherum hymenoides Shrubland (CEGL001373)
  Sarcobatus vermiculatus / Artemisia tridentata Shrubland (CEGL001359)
  Sarcobatus vermiculatus / Atriplex confertifolia - (Picrothamnus desertorum, Suaeda moquinii) Shrubland (CEGL001371)
  Sarcobatus vermiculatus / Distichlis spicata Shrubland (CEGL001363)
  Sarcobatus vermiculatus / Elymus elymoides - Pascopyrum smithii Shrubland (CEGL001365)
  Sarcobatus vermiculatus / Elymus elymoides Shrubland (CEGL001372)
  Sarcobatus vermiculatus / Ericameria nauseosa Shrubland (CEGL001362)
  Sarcobatus vermiculatus / Leymus cinereus Shrubland (CEGL001366)
  Sarcobatus vermiculatus / Nitrophila occidentalis - Suaeda moquinii Shrubland (CEGL001369)
  Sarcobatus vermiculatus Shrubland (CEGL001357)
- SARCOBATUS VERMICULATUS INTERMITTENTLY FLOODED SPARSELY VEGETATED ALLIANCE (A.1877)
  Sarcobatus vermiculatus / Sporobolus airoides Sparse Vegetation (CEGL001368)
- SPARTINA GRACILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1407)
  Spartina gracilis Herbaceous Vegetation (CEGL001588)



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- SPOROBOLUS AIROIDES INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1331)
  Sporobolus airoides - Distichlis spicata Herbaceous Vegetation (CEGL001687)
- SUAEDA MOQUINII INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE (A.941)
  Suaeda moquinii Shrubland (CEGL001991)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.787 INTER-MOUNTAIN BASINS SEMI-DESERT GRASSLAND

Division 304,

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This widespread ecological system occurs throughout the Intermountain western U.S. on dry plains and mesas, at approximately 1450 to 2320 m (4750-7610 feet) in elevation. These grasslands occur in lowland and upland areas and may occupy swales, playas, mesa tops, plateau parks, alluvial flats, and plains, but sites are typically xeric. Substrates are often well-drained sandy- or loamy-textured soils derived from sedimentary parent materials, but are quite variable and may include fine-textured soils derived from igneous and metamorphic rocks. When they occur near foothills grasslands they will be at lower elevations. The dominant perennial bunch grasses and shrubs within this system are all very drought-resistant plants. These grasslands are typically dominated or codominated by *Achnatherum hymenoides, Aristida* spp., *Bouteloua gracilis, Hesperostipa comata, Muhlenbergia torreyana*, or *Pleuraphis jamesii*, and may include scattered shrubs and dwarf-shrubs of species of *Artemisia, Atriplex, Coleogyne, Ephedra, Gutierrezia*, or *Krascheninnikovia lanata*.

### DISTRIBUTION

**Range:** Occurs throughout the Intermountain western U.S. on dry plains and mesas, at approximately 1450 to 2320 m (4750-7610 feet) in elevation.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ACHNATHERUM HYMENOIDES HERBACEOUS ALLIANCE (A.1262)
  Achnatherum hymenoides - Sporobolus contractus Herbaceous Vegetation (CEGL001652)
- ACHNATHERUM LETTERMANII HERBACEOUS ALLIANCE (A.2524)
  Achnatherum lettermanii - Oxytropis oreophila Herbaceous Vegetation (CEGL002734)
- ACHNATHERUM NELSONII HERBACEOUS ALLIANCE (A.1271)
  Achnatherum nelsonii - Koeleria macrantha Herbaceous Vegetation (CEGL001707)
- ACHNATHERUM SPECIOSUM HERBACEOUS ALLIANCE (A.1290)
  Achnatherum speciosum Herbaceous Vegetation [Placeholder] (CEGL003112)
- ARISTIDA PURPUREA HERBACEOUS ALLIANCE (A.2570)
  Aristida purpurea Herbaceous Vegetation (CEGL005800)
- BOUTELOUA ERIOPODA HERBACEOUS ALLIANCE (A.1284)
  Bouteloua eriopoda - Hesperostipa neomexicana Herbaceous Vegetation (CEGL001753)
  Bouteloua eriopoda - Pleuraphis jamesii Herbaceous Vegetation (CEGL001751)
  Bouteloua eriopoda Semi-desert Herbaceous Vegetation (CEGL001752)
- BOUTELOUA ERIOPODA MICROPHYLLOUS EVERGREEN SHRUB HERBACEOUS ALLIANCE (A.1545)
  Gutierrezia sarothrae - Krascheninnikovia lanata - Atriplex canescens / Bouteloua eriopoda Shrub Herbaceous Vegetation (CEGL001733)
- BOUTELOUA GRACILIS HERBACEOUS ALLIANCE (A.1282)
  Bouteloua gracilis - Bouteloua curtipendula Herbaceous Vegetation (CEGL001754)
  Bouteloua gracilis - Bouteloua hirsuta Herbaceous Vegetation (CEGL001755)
  Bouteloua gracilis - Hesperostipa comata Herbaceous Vegetation [Provisional] (CEGL002932)
  Bouteloua gracilis - Pleuraphis jamesii Herbaceous Vegetation (CEGL001759)
  Bouteloua gracilis Herbaceous Vegetation (CEGL001760)
- BOUTELOUA HIRSUTA HERBACEOUS ALLIANCE (A.1285)
  Bouteloua hirsuta - Bouteloua radicosa Herbaceous Vegetation (CEGL001765)
- BROMUS INERMIS SEMI-NATURAL HERBACEOUS ALLIANCE (A.3561)
  Bromus inermis - (Pascopyrum smithii) Semi-natural Herbaceous Vegetation (CEGL005264)
- BROMUS TECTORUM SEMI-NATURAL HERBACEOUS ALLIANCE (A.1814)
  Bromus tectorum Semi-natural Herbaceous Vegetation [Placeholder] (CEGL003019)
- ERICAMERIA NAUSEOSA SHRUB SHORT HERBACEOUS ALLIANCE (A.1546)
  Ericameria nauseosa / Bouteloua gracilis Shrub Herbaceous Vegetation (CEGL003495)



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- HESPEROSTIPA COMATA BUNCH HERBACEOUS ALLIANCE (A.1270)
  Hesperostipa comata - (Bouteloua eriopoda, Pleuraphis jamesii) Herbaceous Vegetation (CEGL002997)
  Hesperostipa comata - Achnatherum hymenoides Herbaceous Vegetation (CEGL001703)
  Hesperostipa comata Great Basin Herbaceous Vegetation (CEGL001705)
- HESPEROSTIPA NEOMEXICANA HERBACEOUS ALLIANCE (A.1272)
  Hesperostipa neomexicana Herbaceous Vegetation (CEGL001708)
- MUHLENBERGIA ASPERIFOLIA INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE (A.1334)
  Muhlenbergia asperifolia Herbaceous Vegetation (CEGL001779)
- MUHLENBERGIA MONTANA HERBACEOUS ALLIANCE (A.1260)
  Muhlenbergia (pungens, montana) - Heterotheca villosa Herbaceous Vegetation (CEGL002938)
- PLEURAPHIS JAMESII HERBACEOUS ALLIANCE (A.1287)
  Pleuraphis jamesii Herbaceous Vegetation (CEGL001777)
- PLEURAPHIS JAMESII SHRUB HERBACEOUS ALLIANCE (A.1532)
  Atriplex obovata / Pleuraphis jamesii - Sporobolus airoides Shrub Herbaceous Vegetation (CEGL001775)
- PLEURAPHIS RIGIDA HERBACEOUS ALLIANCE (A.1246)
  Pleuraphis rigida Herbaceous Vegetation [Placeholder] (CEGL003051)
- PLEURAPHIS RIGIDA SHRUB HERBACEOUS ALLIANCE (A.1539)
  Pleuraphis rigida Shrub Herbaceous Vegetation [Placeholder] (CEGL003052)
- POA FENDLERIANA HERBACEOUS ALLIANCE (A.1263)
  Poa fendleriana ssp. fendleriana Herbaceous Vegetation (CEGL001655)
- POA SECUNDA HERBACEOUS ALLIANCE (A.1291)
  Aristida purpurea var. longiseta - Poa secunda Herbaceous Vegetation (CEGL001781)
- POA SECUNDA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1410)
  Poa secunda - Muhlenbergia richardsonis Herbaceous Vegetation (CEGL002755)
  Poa secunda Herbaceous Vegetation (CEGL001657)
- PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE (A.1265)
  Pseudoroegneria spicata - Achnatherum hymenoides Herbaceous Vegetation (CEGL001674)
  Pseudoroegneria spicata ssp. inermis Herbaceous Vegetation (CEGL001661)
- SPOROBOLUS AIROIDES HERBACEOUS ALLIANCE (A.1267)
  Sporobolus airoides Monotype Herbaceous Vegetation (CEGL001688)
- SPOROBOLUS AIROIDES SOD HERBACEOUS ALLIANCE (A.1241)
  Sporobolus airoides - Bouteloua gracilis Herbaceous Vegetation (CEGL001686)
  Sporobolus airoides Sod Herbaceous Vegetation [Placeholder] (CEGL001791)
- SPOROBOLUS CRYPTANDRUS HERBACEOUS ALLIANCE (A.1252)
  Aristida purpurea var. longiseta - Pseudoroegneria spicata - Sporobolus cryptandrus Herbaceous Vegetation (CEGL001589)
  Aristida purpurea var. longiseta - Sporobolus cryptandrus Herbaceous Vegetation (CEGL001515)
  Sporobolus cryptandrus - Poa secunda Herbaceous Vegetation (CEGL001516)
  Sporobolus cryptandrus Great Basin Herbaceous Vegetation (CEGL002691)
- SPOROBOLUS CRYPTANDRUS SHRUB HERBACEOUS ALLIANCE (A.1525)
  Sporobolus cryptandrus Shrub Herbaceous Vegetation (CEGL001514)
- THINOPYRUM INTERMEDIUM SEMI-NATURAL HERBACEOUS ALLIANCE (A.2529)
  Thinopyrum intermedium Semi-natural Herbaceous Vegetation (CEGL002935)

**Environment:** Low-elevation grasslands in the Intermountain West region occur in semi-arid to arid climates at approximately 1450 to 2320 m (4750-7610 feet) in elevation. Grasslands within this system are typically characterized by a sparse to moderately dense herbaceous layer dominated by medium-tall and short bunch grasses, often in a sod-forming growth. These grasslands occur in lowland and upland areas and may occupy swales, playas, mesa tops, plateau parks, alluvial flats, and plains. These grasslands typically occur on xeric sites. This system experiences cold temperate conditions. Hot summers and cold winters with freezing temperatures and snow are common. Annual precipitation is usually from 20-40 cm (7.9-15.7 inches). A significant portion of the precipitation falls in July through October during the summer monsoon storms, with the rest falling as snow during the winter and early spring months.

These grasslands occur on a variety of aspects and slopes. Sites may range from flat to moderately steep. Soils supporting this system also vary from deep to shallow, and from sandy to finer-textured. The substrate is typically sand- or shale-derived. Some sandy soil occurrences have a high cover of cryptogams on the soil. These cryptogamic species would tend to increase the stability of the highly erodible sandy soils of these grasslands during torrential summer rains and heavy wind storms (Kleiner and Harper 1977). *Muhlenbergia*-dominated grasslands which flood temporarily, combined with high evaporation rates in this dry system, can have accumulations of soluble salts in the soil. Soil salinity depends on the amount and timing of precipitation and flooding.

**Dynamics:** This system is maintained by frequent fires and sometimes associated with specific soils, often well-drained clay soils. A combination of precipitation, temperature, and soils limits this system to the lower elevations within the region. The dominant perennial bunch grasses and shrubs within this system are all very drought-resistant plants. Grasses that dominate semi-arid grasslands develop a dense network of roots concentrated in the upper parts of the soil where rainfall penetrates most frequently (Blydenstein 1966, Cable 1969, Sala and Lauenroth 1985, as cited by McClaran and Van Devender 1995).



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*Bouteloua gracilis* is also very grazing-tolerant and generally forms a short sod. *Pleuraphis jamesii* is only moderately palatable to livestock, but decreases when heavily grazed during drought and in the more arid portions of its range where it is the dominant grass (West 1972). This grass reproduces extensively from scaly rhizomes. These rhizomes make the plant resistant to trampling by livestock and have good soil-binding properties (Weaver and Albertson 1956, West 1972). *Achnatherum hymenoides* is one of the most drought-tolerant grasses in the western U.S. (USDA 1937). It is also a valuable forage grass in arid and semi-arid regions. Improperly managed livestock grazing could increase soil erosion, decrease cover of this palatable plant species and increase weedy species (USDA 1937). *Muhlenbergia asperifolia* with its flooding regime combined with high evaporation rate in these dry climates causes accumulations of soluble salts in the soil. Total vegetation cover (density and height), species composition and soil salinity depend on the amount and timing of precipitation and flooding. Growth-inhibiting salt concentrations are diluted when the soil is saturated allowing the growth of less salt-tolerant species. As the saturated soils dry, the salt concentrates until it precipitates out on the soil surface (Dodd and Coupland 1966, Ungar 1968). *Hesperostipa comata* is a deep-rooted grass that uses soil moisture below 0.5 m during the dry summers.

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES304.788 INTER-MOUNTAIN BASINS SEMI-DESERT SHRUB-STEPPE

Division 304,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This ecological system occurs throughout the Intermountain western U.S., typically at lower elevations on alluvial fans and flats with moderate to deep soils. This semi-arid shrub-steppe is typically dominated by graminoids (>25% cover) with an open shrub layer, but may include sparse shrublands without a strong graminoid layer. Characteristic grasses include *Achnatherum hymenoides, Bouteloua gracilis, Distichlis spicata, Hesperostipa comata, Pleuraphis jamesii, Poa secunda*, and *Sporobolus airoides*. The woody layer is often a mixture of shrubs and dwarf-shrubs. Characteristic species include *Atriplex canescens, Artemisia filifolia, Chrysothamnus greenei, Chrysothamnus viscidiflorus, Ephedra cutleri, Ephedra nevadensis, Ephedra torreyana, Ephedra viridis, Ericameria nauseosa, Gutierrezia sarothrae*, and *Krascheninnikovia lanata*. *Artemisia tridentata* may be present but does not dominate. The general aspect of occurrences may be either open shrubland with patchy grasses or patchy open herbaceous layer. Disturbance may be important in maintaining the woody component. Microphytic crust is very important in some occurrences.

### DISTRIBUTION

**Range:** Occurs throughout the Intermountain western U.S., typically at lower elevations.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ACHNATHERUM HYMENOIDES SHRUB HERBACEOUS ALLIANCE (A.1543)
  Ephedra viridis / Achnatherum hymenoides - Bouteloua gracilis Shrub Herbaceous Vegetation (CEGL001648)
  Ephedra viridis / Achnatherum hymenoides - Sporobolus cryptandrus Shrub Herbaceous Vegetation (CEGL001649)
- ACHNATHERUM SPECIOSUM SHRUB HERBACEOUS ALLIANCE (A.1549)
  Achnatherum speciosum Shrub Herbaceous Vegetation [Placeholder] (CEGL003113)
- ARTEMISIA FILIFOLIA SHRUBLAND ALLIANCE (A.816)
  Artemisia filifolia - Ephedra (torreyana, viridis) Shrubland (CEGL002786)
  Artemisia filifolia Colorado Plateau Shrubland (CEGL002697)
- BOUTELOUA ERIOPODA MICROPHYLLOUS EVERGREEN SHRUB HERBACEOUS ALLIANCE (A.1545)
  Gutierrezia sarothrae - Krascheninnikovia lanata - Atriplex canescens / Bouteloua eriopoda Shrub Herbaceous Vegetation (CEGL001733)
- BOUTELOUA ERIOPODA XEROMORPHIC SHRUB HERBACEOUS ALLIANCE (A.1553)
  Bouteloua eriopoda Coconino Plateau Shrub Herbaceous Vegetation (CEGL002787)
  Ephedra torreyana / Bouteloua eriopoda Shrub Herbaceous Vegetation (CEGL001731)
- BOUTELOUA GRACILIS DWARF-SHRUB HERBACEOUS ALLIANCE (A.1571)
  Artemisia bigelovii / Bouteloua gracilis Dwarf-shrub Herbaceous Vegetation (CEGL001742)
  Bouteloua gracilis Dwarf-shrub Herbaceous Vegetation [Placeholder] (CEGL005810)
- BOUTELOUA GRACILIS HERBACEOUS ALLIANCE (A.1282)
  Bouteloua gracilis - Hesperostipa comata Herbaceous Vegetation [Provisional] (CEGL002932)
- CHRYSOTHAMNUS VISCIDIFLORUS SHRUB HERBACEOUS ALLIANCE (A.1524)
  Chrysothamnus viscidiflorus - Ericameria parryi Shrub Herbaceous Vegetation [Provisional] (CEGL002781)
  Chrysothamnus viscidiflorus / Leymus salinus ssp. salinus Shrub Herbaceous Vegetation (CEGL001501)
  Chrysothamnus viscidiflorus / Poa pratensis Semi-natural Shrub Herbaceous Vegetation [Provisional] (CEGL002933)



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- EPHEDRA NEVADENSIS SHRUBLAND ALLIANCE (A.857)
  Ephedra nevadensis / Achnatherum hymenoides Shrubland (CEGL001255)
  Ephedra nevadensis Basalt Shrubland [Provisional] (CEGL002936)
- EPHEDRA TORREYANA SHRUBLAND ALLIANCE (A.2572)
  Ephedra torreyana - Achnatherum hymenoides Hummock Shrubland (CEGL005802)
- ERICAMERIA NAUSEOSA SHRUB SHORT HERBACEOUS ALLIANCE (A.1546)
  Ericameria nauseosa / Bouteloua gracilis Shrub Herbaceous Vegetation (CEGL003495)
  Ericameria nauseosa / Muhlenbergia pungens - Achnatherum hymenoides Shrub Herbaceous Vegetation (CEGL002921)
- ERICAMERIA NAUSEOSA SHRUBLAND ALLIANCE (A.835)
  Ericameria nauseosa / Bromus tectorum Semi-natural Shrubland (CEGL002937)
- ERICAMERIA PARRYI SHRUBLAND ALLIANCE (A.818)
  Ericameria parryi / Pleuraphis jamesii - Bouteloua gracilis Shrubland (CEGL001331)
- GRAYIA SPINOSA SHRUBLAND ALLIANCE (A.1038)
  Grayia spinosa / Poa secunda Shrubland (CEGL001351)
- GUTIERREZIA SAROTHRAE DWARF-SHRUBLAND ALLIANCE (A.2528)
  Gutierrezia sarothrae - (Opuntia spp.) / Pleuraphis jamesii Dwarf-shrubland (CEGL002690)
- KRASCHENINNIKOVIA LANATA DWARF-SHRUB HERBACEOUS ALLIANCE (A.1565)
  Krascheninnikovia lanata / Bouteloua gracilis Dwarf-shrub Herbaceous Vegetation (CEGL001321)
  Krascheninnikovia lanata / Pascopyrum smithii - Bouteloua gracilis Dwarf-shrub Herbaceous Vegetation (CEGL001324)
- KRASCHENINNIKOVIA LANATA DWARF-SHRUBLAND ALLIANCE (A.1104)
  Krascheninnikovia lanata / Pleuraphis jamesii Dwarf-shrubland (CEGL001322)
  Krascheninnikovia lanata / Poa secunda Dwarf-shrubland (CEGL001326)
- PLEURAPHIS JAMESII SHRUB HERBACEOUS ALLIANCE (A.1532)
  Atriplex obovata / Pleuraphis jamesii - Sporobolus airoides Shrub Herbaceous Vegetation (CEGL001775)
  Ericameria nauseosa / Pleuraphis jamesii - (Hesperostipa comata) Shrub Herbaceous Vegetation (CEGL002996)
  Gutierrezia sarothrae / Sporobolus airoides - Pleuraphis jamesii Shrub Herbaceous Vegetation (CEGL001776)
- PLEURAPHIS RIGIDA / GUTIERREZIA SAROTHRAE SHRUB HERBACEOUS ALLIANCE (A.1529)
  Gutierrezia sarothrae / Pleuraphis rigida Shrub Herbaceous Vegetation (CEGL001543)
- POLIOMINTHA INCANA SHRUBLAND ALLIANCE (A.862)
  Poliomintha incana / (Pleuraphis jamesii) Shrubland (CEGL002930)
- SPHAEROMERIA ARGENTEA HERBACEOUS ALLIANCE (A.1654)
  Sphaeromeria argentea - Achnatherum swallenii Herbaceous Vegetation (CEGL001993)
  Sphaeromeria argentea - Artemisia frigida - Poa secunda Herbaceous Vegetation (CEGL001992)

**Environment:** This ecological system occurs throughout the Intermountain West from the western Great Basin to the northern Rocky Mountains and Colorado Plateau at elevations ranging from 300 m up to 2500 m. The climate where this system occurs is generally hot in summers and cold in winters with low annual precipitation, ranging from 18-40 cm and high inter-annual variation. Much of the precipitation falls as snow, and growing-season drought is characteristic. Temperatures are continental with large annual and diurnal variation. Sites are generally alluvial fans and flats with moderate to deep soils. Some sites can be flat, poorly drained and intermittently flooded with a shallow or perched water table often within 1 m depth (West 1983). Substrates are generally shallow, calcareous, fine-textured soils (clays to silt-loams), derived from alluvium; or deep, fine to medium-textured alluvial soils with some source of sub-irrigation during the summer season. Soils may be alkaline and typically moderately saline (West 1983). Some occurrences occur on deep, sandy soils, or soils that are highly calcareous (Hironaka et al. 1983).

**Vegetation:** The plant associations in this system are characterized by a somewhat sparse to moderately dense (10-70% cover) shrub layer of *Artemisia filifolia, Ephedra cutleri, Ephedra nevadensis, Ephedra torreyana, Ephedra viridis, Ericameria nauseosa, Chrysothamnus viscidiflorus, Gutierrezia sarothrae, Sarcobatus vermiculatus*, or *Atriplex canescens*. Other shrubs occasionally present include *Purshia tridentata* and *Tetradymia canescens*. *Artemisia tridentata* may be present but does not dominate. Trees are very rarely present in this system, but some individuals of *Pinus ponderosa, Juniperus scopulorum, Juniperus occidentalis*, or *Cercocarpus ledifolius* may occur. The herbaceous layer is dominated by bunch grasses which occupy patches in the shrub matrix. The most widespread species is *Pseudoroegneria spicata*, which occurs from the Columbia Basin to the northern Rockies. Other locally dominant or important species include *Sporobolus airoides, Leymus cinereus, Festuca idahoensis, Pascopyrum smithii, Bouteloua gracilis, Distichlis spicata, Pleuraphis jamesii, Elymus lanceolatus, Elymus elymoides, Koeleria macrantha, Muhlenbergia richardsonis, Hesperostipa comata*, and *Poa secunda*. Annual grasses, especially the exotics *Bromus japonicus* and *Bromus tectorum*, may be present to abundant. Forbs are generally of low importance and are highly variable across the range, but may be diverse in some occurrences. Species that often occur are *Symphyotrichum ascendens (= Aster adscendens), Collinsia parviflora, Penstemon caespitosus, Achillea millefolium, Erigeron compositus, Senecio* spp, and *Taraxacum officinale*. Other important genera include *Astragalus, Oenothera, Eriogonum*, and *Balsamorhiza*. Mosses and lichens may be important ground cover. Forbs are common on disturbed weedy sites. Weedy annual forbs may include the exotics *Descurainia* spp., *Helianthus annuus, Halogeton glomeratus, Lactuca serriola*, and *Lepidium perfoliatum*.



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### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

## CES304.790 INTER-MOUNTAIN BASINS SUBALPINE LIMBER-BRISTLECONE PINE WOODLAND

Division 304,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This ecological system extends from the Mojave Desert and Sierra Nevada across the Great Basin to the Central Wasatch and western Uinta mountains. These open woodlands are typically found on high-elevation ridges and rocky slopes above the subalpine forests and woodlands. Site are harsh, exposed to desiccating winds with rocky substrates and a short growing season that limit plant growth. Parent materials include dolomitic, limestone or granitic rocks. Occurrences can be found on all aspects but are more common on southwest exposures on steep convex slopes and ridges between 2530 and 3600 m (8300-12,000 feet). Stands are strongly dominated by *Pinus flexilis* and/or *Pinus longaeva*. *Pinus monophylla* may be present in lower elevation stands. If present, shrub and herbaceous layers are generally sparse and composed of xeric shrubs, graminoids and cushion plants. Associated species may include *Antennaria rosea, Arenaria kingii, Artemisia tridentata, Cercocarpus intricatus, Chamaebatiaria millefolium, Cymopterus cinerarius, Elymus elymoides, Erigeron pygmaeus, Eriogonum ovalifolium, Festuca brachyphylla, Koeleria macrantha, Leptodactylon pungens, Ribes cereum*, or *Ribes montigenum*.

### DISTRIBUTION

**Range:** Extends from the Mojave Desert and Sierra Nevada across the Great Basin to the Central Wasatch and western Uinta mountains.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ABIES CONCOLOR FOREST ALLIANCE (A.152)
  Abies concolor var. concolor - Pinus ponderosa - Pinus longaeva Forest (CEGL002736)
- PINUS FLEXILIS WOODLAND ALLIANCE (A.540)
  Pinus flexilis / Cercocarpus ledifolius Woodland (CEGL000804)
  Pinus flexilis / Festuca idahoensis Woodland (CEGL000805)
  Pinus flexilis / Juniperus communis Woodland (CEGL000807)
  Pinus flexilis / Juniperus osteosperma Woodland (CEGL000808)
  Pinus flexilis / Mahonia repens Woodland (CEGL000811)
- PINUS LONGAEVA WOODLAND ALLIANCE (A.518)
  Pinus longaeva - Pinus flexilis Woodland [Placeholder] (CEGL003073)

**Environment:** The bristlecone pine-limber pine woodland ecological system denotes some of the driest and windiest sites capable of supporting trees other than *Juniperus*. Sites are typically xeric on exposed, wind-swept rocky slopes and ridges. It can be found on all aspects but is more common on southwest exposures on steep convex slopes and ridges between 8300 and 10,200 feet. It commonly represents a topographic or edaphic climax within the *Abies lasiocarpa* and upper *Pseudotsuga menziesii* zones.

This system occurs on a variety of substrates but is best represented on colluvium derived from limestone and dolomite or Tertiary and Cretaceous sandstone. A characteristic feature is the predominance of bare soil; almost all sites have between 25 and 50% bare ground. Consequently, litter accumulations are slight and intermittent. Most sites are droughty with gravel in the shallow subsurface horizons. Surface textures vary depending upon parent material. Steep slopes, high-intensity summer convection storms, and only partial ground cover for interception often result in severe sheet erosion of fine particles. This usually leads to the development of gravel pavements. Additional erosion can be expected from wind action. High insolation and wind during the winter usually result in reduced snowpack accumulations. However, soils can be expected to freeze.

The sparsity of shrubs, forbs, grasses, and litter in addition to the widely spaced trees usually means that fire does not carry easily. Individual trees may be ignited from lightning, but seldom is an entire occurrence burned.

**Dynamics:** Natural regeneration of *Pinus flexilis* appears to be closely associated with caching of the large wingless seeds, primarily by Clark's nutcracker (*Nucifraga columbiana*) (Lanner and Vander Wall 1980). Germination of cached seeds often

results in the multi-stemmed clumps characteristic of these sites, although the species may produce multiple stems from boles damaged near the ground. Germination and rooting will sometimes be restricted to crevices in rock. *Pinus longaeva* has smaller winged seeds and should be wind disseminated. However, caching by nutcrackers does take place, especially when other *Pinus* species are also available (Dr. Ronal Lanner, USU, pers. comm.). Fires seldom destroy this system due to the sparse nature of the canopy cover of trees and abundant bare ground.

### SPATIAL CHARACTERISTICS

**Adjacent Ecological Systems:** Adjacent vegetation at high elevations includes alpine meadows and shrublands and subalpine forests dominated by *Picea, Abies*, or *Pseudotsuga*. Adjacent montane occurrences are dominated by *Pinus ponderosa, Pinus contorta*, or *Pseudotsuga menziesii*. At lower elevations adjacent vegetation may include *Juniperus*-dominated woodland and savannas; shrublands dominated by species of *Artemisia, Cercocarpus*, or *Purshia tridentata*.

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.809 ROCKY MOUNTAIN ALPINE BEDROCK AND SCREE

Division 306,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Non-vegetated (<10% vasc.), Upland
**Concept Summary:** This ecological system is restricted to the highest elevations of the Rocky Mountains, from Alberta and British Columbia south into New Mexico, west into the highest mountain ranges of the Great Basin. It is composed of barren and sparsely vegetated alpine substrates, typically including both bedrock outcrop and scree slopes, with nonvascular-(lichen) dominated communities. Exposure to desiccating winds, rocky and sometimes unstable substrates, and a short growing season limit plant growth. There can be sparse cover of forbs, grasses, lichens and low shrubs.

### DISTRIBUTION

**Range:** Restricted to the highest elevations of the Rocky Mountains, from Alberta and British Columbia south into New Mexico, west into the highest mountain ranges of the Great Basin.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- AQUILEGIA CAERULEA HERBACEOUS ALLIANCE (A.1603)
  Aquilegia caerulea - Cirsium scopulorum Scree Herbaceous Vegetation (CEGL001938)
- CIRSIUM SCOPULORUM HERBACEOUS ALLIANCE (A.1608)
  Cirsium scopulorum - Polemonium viscosum Herbaceous Vegetation (CEGL001959)
- CLAYTONIA MEGARHIZA HERBACEOUS ALLIANCE (A.1626)
  Claytonia megarhiza Herbaceous Vegetation (CEGL001878)
- IVESIA CRYPTOCAULIS SPARSELY VEGETATED ALLIANCE (A.2513)
  Ivesia cryptocaulis Alpine Sparse Vegetation (CEGL002735)
- POLEMONIUM VISCOSUM HERBACEOUS ALLIANCE (A.1631)
  Polemonium viscosum Herbaceous Vegetation (CEGL001928)
- SENECIO TARAXACOIDES HERBACEOUS ALLIANCE (A.1634)
  Senecio taraxacoides - Oxyria digyna Herbaceous Vegetation (CEGL001932)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.812 ROCKY MOUNTAIN ALPINE-MONTANE WET MEADOW

Division 306,

**Spatial Scale & Pattern:** Small Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland
**Concept Summary:** These are high-elevation communities found throughout the Rocky Mountains and Intermountain regions, dominated by herbaceous species found on wetter sites with very low-velocity surface and subsurface flows. They range in elevation from montane to alpine (1000-3600 m). These types occur as large meadows in montane or subalpine valleys, as narrow strips bordering ponds, lakes, and streams, and along toeslope seeps. They are typically found on flat areas or gentle slopes, but may also occur on sub-irrigated sites with slopes up to 10%. In alpine regions, sites typically are small



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depressions located below late-melting snow patches or on snowbeds. Soils of this system may be mineral or organic. In either case, soils show typical hydric soil characteristics, including high organic content and/or low chroma and redoximorphic features. This system often occurs as a mosaic of several plant associations, often dominated by graminoids, including *Calamagrostis stricta, Caltha leptosepala, Cardamine cordifolia, Carex illota, Carex microptera, Carex nigricans, Carex scopulorum, Carex utriculata, Carex vernacula, Deschampsia caespitosa, Eleocharis quinqueflora, Juncus drummondii, Phippsia algida, Rorippa alpina, Senecio triangularis, Trifolium parryi*, and *Trollius laxus*. Often alpine dwarf-shrublands, especially those dominated by *Salix*, are immediately adjacent to the wet meadows. Wet meadows are tightly associated with snowmelt and typically not subjected to high disturbance events such as flooding.

### DISTRIBUTION

**Range:** Found throughout the Rocky Mountains and Intermountain regions, ranging in elevation from montane to alpine (1000-3600 m).
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- AGROSTIS SCABRA TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1351)
  Agrostis exarata - Agrostis scabra Herbaceous Vegetation (CEGL001557)
- AGROSTIS STOLONIFERA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1405)
  Agrostis stolonifera Herbaceous Vegetation (CEGL001558)
- BETULA NANA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.995)
  Betula nana / Carex utriculata Shrubland (CEGL001079)
  Betula nana / Mesic Forbs - Mesic Graminoids Shrubland (CEGL002653)
- CALAMAGROSTIS CANADENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1400)
  Calamagrostis canadensis - Carex scopulorum - Mertensia ciliata Herbaceous Vegetation (CEGL001560)
  Calamagrostis canadensis - Senecio triangularis Herbaceous Vegetation (CEGL001561)
  Calamagrostis canadensis Western Herbaceous Vegetation (CEGL001559)
- CALAMAGROSTIS STRICTA TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.2594)
  Calamagrostis stricta Herbaceous Vegetation [Provisional] (CEGL002891)
- CALTHA LEPTOSEPALA SATURATED HERBACEOUS ALLIANCE (A.1698)
  Caltha leptosepala - Deschampsia caespitosa Herbaceous Vegetation (CEGL001955)
  Caltha leptosepala - Polygonum bistortoides Herbaceous Vegetation (CEGL001956)
  Caltha leptosepala - Rhodiola rhodantha Herbaceous Vegetation (CEGL001957)
  Caltha leptosepala Herbaceous Vegetation (CEGL001954)
- CAMASSIA (CUSICKII, QUAMASH) SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.2587)
  Camassia cusickii Herbaceous Vegetation (CEGL003440)
- CARDAMINE CORDIFOLIA SATURATED HERBACEOUS ALLIANCE (A.1699)
  Cardamine cordifolia - Caltha leptosepala Herbaceous Vegetation (CEGL001958)
  Cardamine cordifolia - Mertensia ciliata Herbaceous Vegetation (CEGL002662)
- CAREX (LACHENALII, CAPILLARIS, ILLOTA) SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1424)
  Carex capillaris - Polygonum viviparum Herbaceous Vegetation (CEGL001872)
  Carex illota Herbaceous Vegetation (CEGL001876)
  Carex lachenalii Herbaceous Vegetation (CEGL001871)
- CAREX (ROSTRATA, UTRICULATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1403)
  Carex utriculata Herbaceous Vegetation (CEGL001562)
- CAREX AMPLIFOLIA SATURATED HERBACEOUS ALLIANCE (A.2584)
  Carex amplifolia Herbaceous Vegetation (CEGL003427)
- CAREX APERTA SATURATED HERBACEOUS ALLIANCE (A.1468)
  Carex aperta Herbaceous Vegetation (CEGL001801)
- CAREX AQUATILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1404)
  Carex aquatilis - Carex utriculata Herbaceous Vegetation (CEGL001803)
  Carex aquatilis - Pedicularis groenlandica Herbaceous Vegetation (CEGL001804)
  Carex aquatilis Herbaceous Vegetation (CEGL001802)
- CAREX AQUATILIS VAR. DIVES SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1412)
  Carex aquatilis var. dives Herbaceous Vegetation (CEGL001826)
- CAREX ARAPAHOENSIS HERBACEOUS ALLIANCE (A.1319)
- CAREX DOUGLASII HERBACEOUS ALLIANCE (A.1286)
  Carex douglasii Herbaceous Vegetation (CEGL001768)
- CAREX DURIUSCULA HERBACEOUS ALLIANCE (A.1283)
  Carex duriuscula Herbaceous Vegetation (CEGL001874)
- CAREX LASIOCARPA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1415)
  Carex lasiocarpa Herbaceous Vegetation (CEGL001810)
- CAREX LIMOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1416)
  Carex limosa Herbaceous Vegetation (CEGL001811)



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- CAREX MICROGLOCHIN SATURATED HERBACEOUS ALLIANCE (A.1470)
  Carex microglochin Herbaceous Vegetation (CEGL001877)
- CAREX MICROPTERA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1411)
  Carex microptera Herbaceous Vegetation (CEGL001792)
- CAREX NEBRASCENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1417)
  Carex nebrascensis - Carex microptera Herbaceous Vegetation (CEGL001815)
  Carex nebrascensis - Catabrosa aquatica Herbaceous Vegetation (CEGL001814)
  Carex nebrascensis Herbaceous Vegetation (CEGL001813)
  Carex nebrascensis Slope Herbaceous Vegetation (CEGL002890)
- CAREX NIGRICANS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1418)
  Carex nigricans - Juncus drummondii Herbaceous Vegetation (CEGL001818)
  Carex nigricans Herbaceous Vegetation (CEGL001816)
- CAREX PELLITA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1414)
  Carex pellita Herbaceous Vegetation (CEGL001809)
- CAREX PRAEGRACILIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1419)
  Carex praegracilis - Carex aquatilis Herbaceous Vegetation (CEGL001821)
  Carex praegracilis Herbaceous Vegetation (CEGL002660)
- CAREX PYRENAICA HERBACEOUS ALLIANCE (A.1320)
  Carex pyrenaica Herbaceous Vegetation (CEGL001860)
- CAREX SAXATILIS TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1357)
  Carex saxatilis Herbaceous Vegetation (CEGL001769)
- CAREX SCIRPOIDEA SSP. PSEUDOSCIRPOIDEA HERBACEOUS ALLIANCE (A.1306)
  Carex scirpoidea ssp. pseudoscirpoidea Herbaceous Vegetation (CEGL001865)
- CAREX SCOPULORUM SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1420)
  Carex scopulorum - Caltha leptosepala Herbaceous Vegetation (CEGL001823)
  Carex scopulorum - Elymus trachycaulus Herbaceous Vegetation (CEGL001824)
  Carex scopulorum Herbaceous Vegetation (CEGL001822)
- CAREX SIMULATA SATURATED HERBACEOUS ALLIANCE (A.1469)
  Carex simulata Herbaceous Vegetation (CEGL001825)
- CAREX STRAMINIFORMIS HERBACEOUS ALLIANCE (A.1314)
  Carex straminiformis Herbaceous Vegetation (CEGL001793)
- CAREX VERNACULA HERBACEOUS ALLIANCE (A.1309)
  Carex vernacula - Poa fendleriana Herbaceous Vegetation (CEGL001869)
- CAREX VESICARIA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.2501)
  Carex vesicaria Herbaceous Vegetation (CEGL002661)
- DASIPHORA FRUTICOSA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.958)
  Dasiphora fruticosa ssp. floribunda / Carex spp. Shrubland (CEGL001106)
  Dasiphora fruticosa ssp. floribunda / Deschampsia caespitosa Shrubland (CEGL001107)
  Dasiphora fruticosa ssp. floribunda Shrubland [Provisional] (CEGL001105)
- DESCHAMPSIA CAESPITOSA SATURATED HERBACEOUS ALLIANCE (A.1456)
  Deschampsia caespitosa - Caltha leptosepala Herbaceous Vegetation (CEGL001882)
- DESCHAMPSIA CAESPITOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1408)
  Deschampsia caespitosa - Carex microptera Herbaceous Vegetation (CEGL001883)
  Deschampsia caespitosa - Carex nebrascensis Herbaceous Vegetation (CEGL001601)
  Deschampsia caespitosa - Ligusticum tenuifolium Herbaceous Vegetation (CEGL001885)
  Deschampsia caespitosa Herbaceous Vegetation (CEGL001599)
- DESCHAMPSIA CAESPITOSA TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1355)
  Agrostis pallens Herbaceous Vegetation (CEGL001600)
  Deschampsia caespitosa - Achillea millefolium var. occidentalis Herbaceous Vegetation (CEGL001880)
  Deschampsia caespitosa - Carex douglasii Herbaceous Vegetation (CEGL001602)
  Deschampsia caespitosa - Carex spp. Herbaceous Vegetation (CEGL001603)
  Deschampsia caespitosa - Geum rossii Herbaceous Vegetation (CEGL001884)
  Deschampsia caespitosa - Luzula multiflora Herbaceous Vegetation (CEGL001886)
  Deschampsia caespitosa - Mertensia ciliata Herbaceous Vegetation (CEGL001887)
  Deschampsia caespitosa - Phleum alpinum Herbaceous Vegetation (CEGL001888)
  Deschampsia caespitosa - Potentilla diversifolia Herbaceous Vegetation (CEGL001889)
  Deschampsia caespitosa - Symphyotrichum foliaceum Herbaceous Vegetation (CEGL001881)
  Festuca idahoensis - Deschampsia caespitosa Herbaceous Vegetation (CEGL001900)
- ELEOCHARIS (QUINQUEFLORA, ROSTELLATA) SATURATED HERBACEOUS ALLIANCE (A.1423)
  Eleocharis quinqueflora - Carex scopulorum Herbaceous Vegetation (CEGL001837)
  Eleocharis quinqueflora Herbaceous Vegetation (CEGL001836)
  Eleocharis rostellata Herbaceous Vegetation (CEGL003428)
- ELEOCHARIS ACICULARIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1421)
  Eleocharis acicularis Herbaceous Vegetation (CEGL001832)

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- ELEOCHARIS PALUSTRIS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1422)
  Eleocharis palustris - Distichlis spicata Herbaceous Vegetation (CEGL001834)
  Eleocharis palustris - Juncus balticus Herbaceous Vegetation (CEGL001835)
  Eleocharis palustris Herbaceous Vegetation (CEGL001833)
- EQUISETUM (ARVENSE, VARIEGATUM) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.3539)
  Equisetum arvense Herbaceous Vegetation (CEGL003314)
- EQUISETUM FLUVIATILE SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1678)
  Equisetum fluviatile Herbaceous Vegetation (CEGL002746)
- GEUM ROSSII HERBACEOUS ALLIANCE (A.1645)
  Geum rossii - Polygonum bistortoides Herbaceous Vegetation (CEGL001967)
  Geum rossii - Sibbaldia procumbens Herbaceous Vegetation (CEGL001969)
- GLYCERIA (GRANDIS, STRIATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.2578)
  Glyceria grandis Herbaceous Vegetation (CEGL003429)
  Glyceria striata Herbaceous Vegetation (CEGL000219)
- GLYCERIA BOREALIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1445)
  Glyceria borealis Herbaceous Vegetation (CEGL001569)
- HERACLEUM MAXIMUM TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1661)
  Heracleum maximum - Rudbeckia occidentalis Herbaceous Vegetation (CEGL001940)
- JUNCUS BALTICUS SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1374)
  Juncus balticus - Carex rossii Herbaceous Vegetation (CEGL001839)
  Juncus balticus Herbaceous Vegetation (CEGL001838)
- JUNCUS DRUMMONDII HERBACEOUS ALLIANCE (A.1324)
  Juncus drummondii - Antennaria lanata Herbaceous Vegetation (CEGL001904)
  Juncus drummondii - Carex spp. Herbaceous Vegetation (CEGL001905)
- JUNCUS PARRYI HERBACEOUS ALLIANCE (A.1325)
  Juncus parryi - Erigeron ursinus Herbaceous Vegetation (CEGL001906)
- PHIPPSIA ALGIDA SATURATED HERBACEOUS ALLIANCE (A.2595)
  Phippsia algida Herbaceous Vegetation (CEGL002892)
- PHLEUM ALPINUM TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1360)
  Phleum alpinum - Carex aquatilis Herbaceous Vegetation (CEGL001921)
  Phleum alpinum - Carex microptera Herbaceous Vegetation (CEGL001922)
- POA GLAUCA TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1361)
  Poa glauca Herbaceous Vegetation (CEGL001926)
- POA PALUSTRIS SEMI-NATURAL SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1409)
  Poa palustris Herbaceous Vegetation (CEGL001659)
- PRIMULA PARRYI TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1665)
  Primula parryi Herbaceous Vegetation (CEGL001983)
- RHODIOLA RHODANTHA TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1659)
  Rhodiola rhodantha Herbaceous Vegetation (CEGL001931)
- RORIPPA ALPINA SATURATED HERBACEOUS ALLIANCE (A.1700)
  Rorippa alpina Herbaceous Vegetation (CEGL002009)
- SAXIFRAGA ODONTOLOMA TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1666)
  Saxifraga odontoloma Herbaceous Vegetation (CEGL001985)
- SENECIO TRIANGULARIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1680)
  Senecio triangularis - Mimulus guttatus Herbaceous Vegetation (CEGL001988)
- SENECIO TRIANGULARIS TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1667)
  Senecio triangularis - Veratrum californicum Herbaceous Vegetation (CEGL001989)
  Senecio triangularis Herbaceous Vegetation (CEGL001987)
- TRICHOPHORUM CAESPITOSUM SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1446)
  Trichophorum caespitosum - Carex livida Herbaceous Vegetation (CEGL001842)

**Environment:** Moisture for these wet meadow community types is acquired from groundwater, stream discharge, overland flow, overbank flow, and on-site precipitation. Salinity and alkalinity are generally low due to the frequent flushing of moisture through the meadow. Depending on the slope, topography, hydrology, soils and substrate, intermittent, ephemeral, or permanent pools may be present. These areas may support species more representative of purely aquatic environments. Standing water may be present during some or all of the growing season, with water tables typically remaining at or near the soil surface. Fluctuations of the water table throughout the growing season are not uncommon, however. On drier sites supporting the less mesic types, the late-season water table may be one meter or more below the surface.

Soils typically possess a high proportion of organic matter, but this may vary considerably depending on the frequency and magnitude of alluvial deposition (Kittel et. al. 1998). Organic composition of the soil may include a thin layer near the soil surface or accumulations of highly sapric material of up to 120 cm thick. Soils may exhibit gleying and/or mottling throughout the profile.

Wet meadow ecological systems provide important water filtration, flow attenuation, and wildlife habitat functions.



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**Dynamics:** Associations in this ecological system are adapted to soils that may be flooded or saturated throughout the growing season. They may also occur on areas with soils that are only saturated early in the growing season, or intermittently. Typically these associations are tolerant of moderate-intensity ground fires and late-season livestock grazing (Kovalchik 1987). Most appear to be relatively stable types, although in some areas these may be impacted by intensive livestock grazing.

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.813 ROCKY MOUNTAIN ASPEN FOREST AND WOODLAND

Division 306,

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This widespread ecological system is more common in the southern and central Rocky Mountains, but occurs throughout much of the western U.S. and north into Canada, in the montane and subalpine zones. Elevations generally range from 1525 to 3050 m (5000-10,000 feet), but occurrences can be found at lower elevations in some regions. Distribution of this ecological system is primarily limited by adequate soil moisture required to meet its high evapotranspiration demand, and secondarily is limited by the length of the growing season or low temperatures. These are upland forests and woodlands dominated by *Populus tremuloides* without a significant conifer component (<25% relative tree cover). The understory structure may be complex with multiple shrub and herbaceous layers, or simple with just an herbaceous layer. The herbaceous layer may be dense or sparse, dominated by graminoids or forbs. Associated shrub species include *Symphoricarpos* spp., *Rubus parviflorus, Amelanchier alnifolia*, and *Arctostaphylos uva-ursi*. Occurrences of this system originate and are maintained by stand-replacing disturbances such as avalanches, crown fire, insect outbreak, disease and windthrow, or clearcutting by man or beaver, within the matrix of conifer forests.

### DISTRIBUTION

**Range:** More common in the southern and central Rocky Mountains, but occurs throughout much of the western U.S. and north into Canada, in the montane and subalpine zones. Elevations generally range from 1525 to 3050 m (5000-10,000 feet), but occurrences can be found at lower elevations in some regions.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- POPULUS TREMULOIDES FOREST ALLIANCE (A.274)
  Populus tremuloides / Acer glabrum Forest (CEGL000563)
  Populus tremuloides / Amelanchier alnifolia - Symphoricarpos oreophilus / Bromus carinatus Forest (CEGL000566)
  Populus tremuloides / Amelanchier alnifolia - Symphoricarpos oreophilus / Calamagrostis rubescens Forest (CEGL000567)
  Populus tremuloides / Amelanchier alnifolia - Symphoricarpos oreophilus / Tall Forbs Forest (CEGL000568)
  Populus tremuloides / Amelanchier alnifolia - Symphoricarpos oreophilus / Thalictrum fendleri Forest (CEGL000569)
  Populus tremuloides / Amelanchier alnifolia / Pteridium aquilinum Forest (CEGL000565)
  Populus tremuloides / Amelanchier alnifolia / Tall Forbs Forest (CEGL000570)
  Populus tremuloides / Amelanchier alnifolia / Thalictrum fendleri Forest (CEGL000571)
  Populus tremuloides / Amelanchier alnifolia Forest (CEGL000564)
  Populus tremuloides / Artemisia tridentata Forest (CEGL000572)
  Populus tremuloides / Bromus carinatus Forest (CEGL000573)
  Populus tremuloides / Calamagrostis rubescens Forest (CEGL000575)
  Populus tremuloides / Carex geyeri Forest (CEGL000579)
  Populus tremuloides / Carex rossii Forest (CEGL000580)
  Populus tremuloides / Carex siccata Forest (CEGL000578)
  Populus tremuloides / Ceanothus velutinus Forest (CEGL000581)
  Populus tremuloides / Corylus cornuta Forest (CEGL000583)
  Populus tremuloides / Festuca thurberi Forest (CEGL000585)
  Populus tremuloides / Heracleum sphondylium Forest (CEGL000586)
  Populus tremuloides / Hesperostipa comata Forest (CEGL000608)
  Populus tremuloides / Juniperus communis / Carex geyeri Forest (CEGL000588)
  Populus tremuloides / Juniperus communis / Lupinus argenteus Forest (CEGL000589)
  Populus tremuloides / Juniperus communis Forest (CEGL000587)
  Populus tremuloides / Ligusticum filicinum Forest (CEGL000591)
  Populus tremuloides / Lonicera involucrata Forest (CEGL000592)
  Populus tremuloides / Lupinus argenteus Forest (CEGL000593)



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Populus tremuloides / Mahonia repens Forest (CEGL000594)
Populus tremuloides / Osmorhiza occidentalis Forest (CEGL000595)
Populus tremuloides / Prunus virginiana Forest (CEGL000596)
Populus tremuloides / Pteridium aquilinum Forest (CEGL000597)
Populus tremuloides / Rubus parviflorus Forest (CEGL000602)
Populus tremuloides / Rudbeckia occidentalis Forest (CEGL000603)
Populus tremuloides / Salix scouleriana Forest (CEGL000604)
Populus tremuloides / Sambucus racemosa Forest (CEGL000605)
Populus tremuloides / Shepherdia canadensis Forest (CEGL000606)
Populus tremuloides / Spiraea betulifolia Forest (CEGL000607)
Populus tremuloides / Symphoricarpos albus Forest (CEGL000609)
Populus tremuloides / Symphoricarpos oreophilus / Bromus carinatus Forest (CEGL000611)
Populus tremuloides / Symphoricarpos oreophilus / Calamagrostis rubescens Forest (CEGL000612)
Populus tremuloides / Symphoricarpos oreophilus / Carex rossii Forest (CEGL000613)
Populus tremuloides / Symphoricarpos oreophilus / Festuca thurberi Forest (CEGL000614)
Populus tremuloides / Symphoricarpos oreophilus / Tall Forbs Forest (CEGL000615)
Populus tremuloides / Symphoricarpos oreophilus / Thalictrum fendleri Forest (CEGL000616)
Populus tremuloides / Symphoricarpos oreophilus / Wyethia amplexicaulis Forest (CEGL000617)
Populus tremuloides / Symphoricarpos oreophilus Forest (CEGL000610)
Populus tremuloides / Tall Forbs Forest (CEGL000618)
Populus tremuloides / Thalictrum fendleri Forest (CEGL000619)
Populus tremuloides / Vaccinium myrtillus Forest (CEGL000620)
Populus tremuloides / Wyethia amplexicaulis Forest (CEGL000622)

- POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE (A.300)
  Populus tremuloides / Quercus gambelii / Symphoricarpos oreophilus Forest (CEGL000598)
  Populus tremuloides / Ribes montigenum Forest (CEGL000600)
- POPULUS TREMULOIDES WOODLAND ALLIANCE (A.610)
  Populus tremuloides / Symphoricarpos albus / Elymus glaucus Woodland (CEGL000946)

**Environment:** Climate is temperate with a relatively long growing season, typically cold winters and deep snow. Mean annual precipitation is greater than 15 inches and typically greater than 20 inches, except in semi-arid environments where occurrences are restricted to mesic microsites such as seeps or large snow drifts. Distribution of this ecological system is primarily limited by adequate soil moisture required to meet its high evapotranspiration demand (Mueggler 1988). Secondarily, its range is limited by the length of the growing season or low temperatures (Mueggler 1988). Topography is variable, sites range from level to steep slopes. Aspect varies according to the limiting factors. Occurrences at high elevations are restricted by cold temperatures and are found on warmer southern aspects. At lower elevations occurrences are restricted by lack of moisture and are found on cooler north aspects and mesic microsites. The soils are typically deep and well developed with rock often absent from the soil. Soil texture ranges from sandy loam to clay loams. Parent materials are variable and may include sedimentary, metamorphic or igneous rocks, but it appears to grow best on limestone, basalt, and calcareous or neutral shales (Mueggler 1988).

**Vegetation:** Occurrences have a somewhat closed canopy of trees of 5-20 m tall that is dominated by the cold-deciduous, broad-leaved tree *Populus tremuloides*. Conifers that may be present but never codominant include *Abies concolor, Abies lasiocarpa, Picea engelmannii, Picea pungens, Pinus ponderosa*, and *Pseudotsuga menziesii*. Conifer species may contribute up to 15% of the tree canopy before the occurrence is reclassified as a mixed occurrence. Because of the open growth form of *Populus tremuloides*, enough light can penetrate for lush understory development. Depending on available soil moisture and other factors like disturbance, the understory structure may be complex with multiple shrub and herbaceous layers, or simple with just an herbaceous layer. The herbaceous layer may be dense or sparse, dominated by graminoids or forbs.

Common shrubs include *Acer glabrum, Amelanchier alnifolia, Artemisia tridentata, Juniperus communis, Prunus virginiana, Rosa woodsii, Shepherdia canadensis, Symphoricarpos oreophilus*, and the dwarf-shrubs *Mahonia repens* and *Vaccinium* spp. The herbaceous layers may be lush and diverse. Common graminoids may include *Bromus carinatus, Calamagrostis rubescens, Carex siccata (= Carex foenea), Carex geyeri, Carex rossii, Elymus glaucus, Elymus trachycaulus, Festuca thurberi*, and *Hesperostipa comata*. Associated forbs may include *Achillea millefolium, Eucephalus engelmannii (= Aster engelmannii), Delphinium* spp., *Geranium viscosissimum, Heracleum sphondylium, Ligusticum filicinum, Lupinus argenteus, Osmorhiza berteroi (= Osmorhiza chilensis), Pteridium aquilinum, Rudbeckia occidentalis, Thalictrum fendleri, Valeriana occidentalis, Wyethia amplexicaulis*, and many others. Exotic grasses such as the perennials *Poa pratensis* and *Bromus inermis* and the annual *Bromus tectorum* are often common in occurrences disturbed by grazing.

**Dynamics:** Occurrences in this ecological system often originate, and are likely maintained, by stand-replacing disturbances such as crown fire, disease and windthrow, or clearcutting by man or beaver. The stems of these thin-barked, clonal trees are easily killed by ground fires, but they can quickly and vigorously resprout in densities of up to 30,000 stems per hectare (Knight 1993). The stems are relatively short-lived (100-150 years), and the occurrence will succeed to longer-lived conifer forest if undisturbed. Occurrences are favored by fire in the conifer zone (Mueggler 1988). With adequate disturbance a clone



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may live many centuries. Although *Populus tremuloides* produces abundant seeds, seedling survival is rare because of the long moist conditions required to establish are rare in the habitats that it occurs in. Superficial soil drying will kill seedlings (Knight 1993).

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.814 ROCKY MOUNTAIN BIGTOOTH MAPLE RAVINE WOODLAND

Division 306,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** low
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This ecological system occurs in cool ravines, on toeslopes and slump benches associated with riparian areas in the northern and central Wasatch Range and Tavaputs Plateau extending into southern Idaho, as well as in scattered localities in southwestern Utah, central Arizona and New Mexico and the Trans-Pecos of Texas. Substrates are typically rocky colluvial or alluvial soils with favorable soil moisture. These woodlands are dominated by *Acer grandidentatum* but may include mixed stands codominated by *Quercus gambelii* or with scattered conifers. Some stands may include *Acer negundo* or *Populus tremuloides* as minor components. It also occurs on steeper, north-facing slopes at higher elevations, often adjacent to Rocky Mountain Gambel Oak-Mixed Montane Shrubland (CES306.818) or Rocky Mountain Aspen Forest and Woodland (CES306.813).

**DISTRIBUTION**

**Range:** Occurs in the northern and central Wasatch Range and Tavaputs Plateau extending into southern Idaho, as well as in scattered localities in southwestern Utah, central Arizona and New Mexico and the Trans-Pecos of Texas.
**Ecological Divisions:**

**CONCEPT**

**Alliances and Associations:**

- ABIES CONCOLOR FOREST ALLIANCE (A.152)
  Abies concolor / Acer grandidentatum Forest (CEGL000241)
- ACER GRANDIDENTATUM MONTANE FOREST ALLIANCE (A.265)
  Acer grandidentatum - Quercus gravesii Forest (CEGL004548)
  Acer grandidentatum - Quercus muehlenbergii Forest (CEGL004547)
  Acer grandidentatum / Calamagrostis rubescens Forest (CEGL000558)
  Acer grandidentatum / Quercus gambelii Forest (CEGL000559)

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.816 ROCKY MOUNTAIN DRY TUNDRA

Division 306,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This widespread ecological system occurs above upper timberline throughout the Rocky Mountain cordillera, including alpine areas of ranges in Utah and Nevada, and north into Canada. It is found on gentle to moderate slopes, flat ridges, valleys, and basins, where the soil has become relatively stabilized and the water supply is more or less constant. Vegetation in these areas is controlled by snow retention, wind desiccation, permafrost, and a short growing season. This system is characterized by a dense cover of low-growing, perennial graminoids and forbs. Rhizomatous, sod-forming sedges are the dominant graminoids, and prostrate and mat-forming plants with thick rootstocks or taproots characterize the forbs. Dominant species include *Artemisia arctica, Carex elynoides, Carex siccata, Carex scirpoidea, Carex nardina, Carex rupestris, Deschampsia caespitosa, Festuca brachyphylla, Festuca idahoensis, Geum rossii, Kobresia myosuroides, Phlox pulvinata*, and *Trifolium dasyphyllum*. Although alpine tundra dry meadow is the matrix of the alpine zone, it typically intermingles with alpine bedrock and scree, ice field, fell-field, alpine dwarf-shrubland, and alpine/subalpine wet meadow systems.

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## DISTRIBUTION

**Range:** Occurs above upper timberline throughout the Rocky Mountain cordillera, including alpine areas of ranges in Utah and Nevada, and north into Canada.

**Ecological Divisions:**

## CONCEPT

**Alliances and Associations:**

- ARTEMISIA ARCTICA HERBACEOUS ALLIANCE (A.1624)
  Artemisia arctica ssp. arctica Herbaceous Vegetation (CEGL001848)
- CALAMAGROSTIS PURPURASCENS HERBACEOUS ALLIANCE (A.1301)
  Calamagrostis purpurascens Herbaceous Vegetation (CEGL001850)
- CAREX (EBENEA, HAYDENIANA) HERBACEOUS ALLIANCE (A.1302)
  Carex ebenea - Trifolium parryi Herbaceous Vegetation (CEGL001873)
  Carex haydeniana Herbaceous Vegetation (CEGL001875)
  Carex spp. - Geum rossii Herbaceous Vegetation (CEGL001870)
- CAREX ARAPAHOENSIS HERBACEOUS ALLIANCE (A.1319)
  Carex arapahoensis Herbaceous Vegetation (CEGL001851)
- CAREX DURIUSCULA HERBACEOUS ALLIANCE (A.1283)
  Carex duriuscula - Poa secunda Herbaceous Vegetation (CEGL001736)
- CAREX ELYNOIDES HERBACEOUS ALLIANCE (A.1303)
  Carex elynoides - Geum rossii Herbaceous Vegetation (CEGL001853)
  Carex elynoides - Lupinus argenteus Herbaceous Vegetation (CEGL001854)
  Carex elynoides - Oreoxis spp. Herbaceous Vegetation (CEGL001855)
  Carex elynoides - Oxytropis sericea Herbaceous Vegetation (CEGL001856)
  Carex elynoides Herbaceous Vegetation (CEGL001852)
- CAREX PERGLOBOSA HERBACEOUS ALLIANCE (A.1304)
  Carex perglobosa - Silene acaulis Herbaceous Vegetation (CEGL001858)
- CAREX RUPESTRIS HERBACEOUS ALLIANCE (A.1307)
  Carex rupestris - Geum rossii Herbaceous Vegetation (CEGL001861)
  Carex rupestris - Potentilla ovina Herbaceous Vegetation (CEGL001862)
  Carex rupestris - Trifolium dasyphyllum Herbaceous Vegetation (CEGL001863)
  Carex rupestris var. drummondiana Herbaceous Vegetation (CEGL001864)
- CAREX SCIRPOIDEA HERBACEOUS ALLIANCE (A.1308)
  Carex scirpoidea - Geum rossii Herbaceous Vegetation (CEGL001866)
  Carex scirpoidea - Potentilla diversifolia Herbaceous Vegetation (CEGL001867)
- CAREX SICCATA HERBACEOUS ALLIANCE (A.1298)
  Carex siccata - Geum rossii Herbaceous Vegetation (CEGL001808)
- CAREX VERNACULA HERBACEOUS ALLIANCE (A.1309)
  Carex vernacula Herbaceous Vegetation (CEGL001868)
- CIRSIUM SCOPULORUM HERBACEOUS ALLIANCE (A.1608)
  Cirsium scopulorum - Polemonium viscosum Herbaceous Vegetation (CEGL001959)
- FESTUCA BRACHYPHYLLA HERBACEOUS ALLIANCE (A.1321)
  Festuca brachyphylla - Geum rossii var. turbinatum Herbaceous Vegetation (CEGL001895)
  Festuca brachyphylla - Trisetum spicatum Herbaceous Vegetation (CEGL001896)
  Festuca brachyphylla Herbaceous Vegetation (CEGL001797)
- FESTUCA THURBERI HERBACEOUS ALLIANCE (A.1256)
  Festuca thurberi Subalpine Grassland Herbaceous Vegetation (CEGL001631)
- GEUM ROSSII HERBACEOUS ALLIANCE (A.1645)
  Geum rossii - Carex albonigra Herbaceous Vegetation (CEGL001966)
  Geum rossii - Minuartia obtusiloba Herbaceous Vegetation (CEGL001965)
  Geum rossii - Selaginella densa Herbaceous Vegetation (CEGL001968)
  Geum rossii - Trifolium spp. Herbaceous Vegetation (CEGL001970)
  Geum rossii Herbaceous Vegetation (CEGL001964)
- KOBRESIA MYOSUROIDES HERBACEOUS ALLIANCE (A.1326)
  Kobresia myosuroides - Carex rupestris var. drummondiana Herbaceous Vegetation (CEGL001907)
  Kobresia myosuroides - Geum rossii Herbaceous Vegetation (CEGL001908)
  Kobresia myosuroides - Trifolium dasyphyllum Herbaceous Vegetation (CEGL001909)
- LEUCOPOA KINGII HERBACEOUS ALLIANCE (A.1323)
  Leucopoa kingii - Carex elynoides Herbaceous Vegetation (CEGL001911)
  Leucopoa kingii - Oxytropis campestris Herbaceous Vegetation (CEGL001912)
  Leucopoa kingii - Phlox pulvinata Herbaceous Vegetation (CEGL001913)
  Leucopoa kingii - Poa fendleriana ssp. fendleriana Herbaceous Vegetation (CEGL001914)
  Leucopoa kingii Herbaceous Vegetation (CEGL001910)

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- MINUARTIA OBTUSILOBA HERBACEOUS ALLIANCE (A.1630)
  Minuartia obtusiloba Herbaceous Vegetation (CEGL001919)
- POA ARCTICA HERBACEOUS ALLIANCE (A.1311)
  Poa arctica ssp. grayana Herbaceous Vegetation (CEGL001924)
- POA LETTERMANII HERBACEOUS ALLIANCE (A.1327)
  Poa lettermanii Herbaceous Vegetation (CEGL001927)
- POA NERVOSA HERBACEOUS ALLIANCE (A.1264)
  Poa nervosa - Achnatherum lettermanii Herbaceous Vegetation (CEGL001656)
- PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE (A.1265)
  Pseudoroegneria spicata - Cushion Plants Herbaceous Vegetation (CEGL001666)
- RIBES MONTIGENUM SHRUBLAND ALLIANCE (A.926)
  Ribes montigenum Shrubland (CEGL001133)
- SAXIFRAGA CHRYSANTHA HERBACEOUS ALLIANCE (A.1632)
  Saxifraga chrysantha Herbaceous Vegetation (CEGL001929)
- SIBBALDIA PROCUMBENS HERBACEOUS ALLIANCE (A.1635)
  Sibbaldia procumbens - Polygonum bistortoides Herbaceous Vegetation (CEGL001933)
- TRIFOLIUM DASYPHYLLUM HERBACEOUS ALLIANCE (A.1637)
  Trifolium dasyphyllum Herbaceous Vegetation (CEGL001935)
- TRIFOLIUM PARRYI HERBACEOUS ALLIANCE (A.1638)
  Trifolium parryi Herbaceous Vegetation (CEGL001936)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.818 ROCKY MOUNTAIN GAMBEL OAK-MIXED MONTANE SHRUBLAND

Division 306,

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This ecological system occurs in the mountains, plateaus and foothills in the southern Rocky Mountains and Colorado Plateau including the Uinta and Wasatch ranges and the Mogollon Rim. These shrublands are most commonly found along dry foothills, lower mountain slopes, and at the edge of the western Great Plains from approximately 2000 to 2900 m in elevation, and are often situated above pinyon-juniper woodlands. Substrates are variable and include soil types ranging from calcareous, heavy, fine-grained loams to sandy loams, gravelly loams, clay loams, deep alluvial sand, or coarse gravel. The vegetation is typically dominated by *Quercus gambelii* alone or codominant with *Amelanchier alnifolia, Amelanchier utahensis, Artemisia tridentata, Cercocarpus montanus, Prunus virginiana, Purshia stansburiana, Purshia tridentata, Robinia neomexicana, Symphoricarpos oreophilus*, or *Symphoricarpos rotundifolius*. There may be inclusions of other mesic montane shrublands with *Quercus gambelii* absent or as a relatively minor component. This ecological system intergrades with the lower montane-foothills shrubland system and shares many of the same site characteristics. Density and cover of *Quercus gambelii* and *Amelanchier* spp. often increase after fire.

### DISTRIBUTION

**Range:** Occurs in the mountains, plateaus and foothills in the southern Rocky Mountains and Colorado Plateau including the Uinta and Wasatch ranges and the Mogollon Rim.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- AMELANCHIER ALNIFOLIA SHRUBLAND ALLIANCE (A.913)
  Amelanchier alnifolia / Artemisia tridentata / Festuca idahoensis Shrubland (CEGL001064)
  Amelanchier alnifolia / Pseudoroegneria spicata Shrubland (CEGL001065)
- AMELANCHIER UTAHENSIS SHRUBLAND ALLIANCE (A.916)
  Amelanchier utahensis - Cercocarpus montanus Shrubland (CEGL001070)
  Amelanchier utahensis / Carex geyeri Shrubland (CEGL001068)
  Amelanchier utahensis / Pseudoroegneria spicata Shrubland (CEGL001069)
  Amelanchier utahensis Shrubland (CEGL001067)
- ARCTOSTAPHYLOS PATULA SHRUBLAND ALLIANCE (A.788)
  Arctostaphylos patula - Quercus gambelii - (Amelanchier utahensis) Shrubland (CEGL002695)
- JUNIPERUS SCOPULORUM WOODLAND ALLIANCE (A.506)
  Juniperus scopulorum - Quercus gambelii Woodland [Provisional] (CEGL002967)
- QUERCUS GAMBELII SHRUBLAND ALLIANCE (A.920)
  Quercus gambelii - Cercocarpus montanus / (Carex geyeri) Shrubland (CEGL001113)



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Quercus gambelii / Amelanchier alnifolia Shrubland (CEGL001109)
Quercus gambelii / Amelanchier utahensis Shrubland (CEGL001110)
Quercus gambelii / Artemisia tridentata Shrubland (CEGL001111)
Quercus gambelii / Carex inops Shrubland (CEGL001112)
Quercus gambelii / Hesperostipa comata Shrubland [Provisional] (CEGL002915)
Quercus gambelii / Paxistima myrsinites Shrubland (CEGL001114)
Quercus gambelii / Poa fendleriana Shrubland [Provisional] (CEGL002949)
Quercus gambelii / Robinia neomexicana / Symphoricarpos rotundifolius Shrubland (CEGL001116)
Quercus gambelii / Robinia neomexicana Shrubland (CEGL001115)
Quercus gambelii / Symphoricarpos oreophilus Shrubland (CEGL001117)

**Environment:** This ecological system typically occupies the lower slope positions of the foothill and lower montane zones. They may occur on level to steep slopes, cliffs, escarpments, rimrock slopes, rocky outcrops, and scree slopes. Climate is semi-arid and characterized by mostly hot-dry summers with mild to cold winters and annual precipitation of 25 to 70 cm. Precipitation mostly occurs as winter snows but may also consist of some late summer rains. Soils are typically poorly developed, rocky to very rocky, and well-drained. Parent materials include alluvium, colluvium, and residuum derived from igneous, metamorphic, or sedimentary rocks such as granite, gneiss, limestone, quartz, monzonite, rhyolite, sandstone, schist, and shale. Although this is a shrub-dominated system, some trees may be present. In older occurrences, or occurrences on mesic sites, some of the shrubs may acquire tree-like sizes. Adjacent communities often include woodlands or forests of *Abies concolor, Pinus ponderosa, Pseudotsuga menziesii*, or *Populus tremuloides* at higher elevations, and *Pinus edulis* and *Juniperus osteosperma* on the lower and adjacent elevations. Shrublands of *Artemisia tridentata* or grasslands of *Festuca* sp., *Stipa* sp., or *Pseudoroegneria* sp. may also be present at the lower elevations.

**Vegetation:** Vegetation types in this system may occur as sparse to dense shrublands composed of moderate to tall shrubs. Occurrences may be multi-layered, with some short shrubby species occurring in the understory of the dominant overstory species. In many occurrences of this system, the canopy is dominated by the broad-leaved deciduous shrub *Quercus gambelii*, which occasionally reaches small tree size. Occurrences can range from dense thickets with little understory to relatively mesic mixed-shrublands with a rich understory of shrubs, grasses and forbs. These shrubs often have a patchy distribution with grass growing in between. Scattered trees are occasionally present in stands and typically include species of *Pinus* or *Juniperus*. Characteristic shrubs that may co-occur, or be singularly dominant, include *Amelanchier alnifolia, Amelanchier utahensis, Arctostaphylos patula, Artemisia tridentata, Cercocarpus montanus, Ptelea trifoliata, Prunus virginiana, Purshia stansburiana, Robinia neomexicana, Rosa* spp., *Symphoricarpos oreophilus*, and *Symphoricarpos rotundifolius*. The herbaceous layer is sparse to moderately dense, ranging from 1-40% cover. Perennial graminoids are the most abundant species, particularly *Bouteloua curtipendula, Bouteloua eriopoda, Bouteloua gracilis, Aristida* spp., *Carex inops, Carex geyeri, Elymus arizonicus, Eragrostis* spp., *Festuca* spp., *Koeleria macrantha, Muhlenbergia* spp., and *Stipa* spp. Many forb and fern species can occur, but none have much cover. Commonly present forbs include *Achillea millefolium, Artemisia* spp., *Geranium* spp., *Maianthemum stellatum, Thalictrum fendleri*, and *Vicia americana*. Ferns include species of *Cheilanthes* and *Woodsia*. Annual grasses and forbs are seasonally present, and weedy annuals are often present, at least seasonally.

**Dynamics:** Fire typically plays an important role in this system, causing die-back of the dominant shrub species in some areas, promoting stump sprouting of the dominant shrubs in other areas, and controlling the invasion of trees into the shrubland system. Natural fires typically result in a system with a mosaic of dense shrub clusters and openings dominated by herbaceous species. In some instances these associations may be seral to the adjacent *Pinus ponderosa, Abies concolor*, and *Pseudotsuga menziesii* woodlands and forests. Ream (1964) noted that on many sites in Utah, Gambel oak may be successional and replaced by bigtooth maple (*Acer grandidentatum).*

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

## CES306.823 ROCKY MOUNTAIN MONTANE DRY-MESIC MIXED CONIFER FOREST AND WOODLAND

Division 306,

**Spatial Scale & Pattern:** Matrix **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This is a highly variable ecological system of the montane zone of the Rocky Mountains. It occurs throughout the southern Rockies, north and west into Utah, Nevada, western Wyoming and Idaho. These are mixed-conifer forests occurring on all aspects at elevations ranging from 1200 to 3300 m. Rainfall averages less than 75 cm per year (40-60 cm) with summer "monsoons" during the growing season contributing substantial moisture. The composition and structure of overstory is dependent upon the temperature and moisture relationships of the site, and the successional status of the



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occurrence. *Pseudotsuga menziesii* and *Abies concolor* are most frequent, but *Pinus ponderosa* may be present to codominant. *Pinus flexilis* is common in Nevada. *Pseudotsuga menziesii* forests occupy drier sites, and *Pinus ponderosa* is a common codominant. *Abies concolor*-dominated forests occupy cooler sites, such as upper slopes at higher elevations, canyon sideslopes, ridgetops, and north- and east-facing slopes which burn somewhat infrequently. *Picea pungens* is most often found in cool, moist locations, often occurring as smaller patches within a matrix of other associations. As many as seven conifers can be found growing in the same occurrence, and there are a number of cold-deciduous shrub and graminoid species common, including *Arctostaphylos uva-ursi, Mahonia repens, Paxistima myrsinites, Symphoricarpos oreophilus, Jamesia americana, Quercus gambelii*, and *Festuca arizonica*. This system was undoubtedly characterized by a mixed severity fire regime in its "natural condition," characterized by a high degree of variability in lethality and return interval.

## DISTRIBUTION

**Range:** Occurs throughout the southern Rockies, north and west into Utah, Nevada, western Wyoming and Idaho.
**Ecological Divisions:**

## CONCEPT

**Alliances and Associations:**

- ABIES CONCOLOR FOREST ALLIANCE (A.152)
  Abies concolor - Pinus ponderosa / Carex inops ssp. inops Forest (CEGL000257)
  Abies concolor - Pinus ponderosa / Cercocarpus ledifolius Forest (CEGL002732)
  Abies concolor - Pinus ponderosa / Symphoricarpos spp. Forest (CEGL000018)
  Abies concolor - Pseudotsuga menziesii / Acer glabrum Forest (CEGL000240)
  Abies concolor - Pseudotsuga menziesii / Erigeron eximius Forest (CEGL000247)
  Abies concolor - Pseudotsuga menziesii / Lathyrus lanszwertii var. leucanthus Forest (CEGL000250)
  Abies concolor - Pseudotsuga menziesii / Vaccinium myrtillus Forest (CEGL000265)
  Abies concolor / Arctostaphylos patula Forest (CEGL000242)
  Abies concolor / Arctostaphylos uva-ursi Forest (CEGL000243)
  Abies concolor / Carex siccata Forest (CEGL000244)
  Abies concolor / Juniperus communis Forest (CEGL000249)
  Abies concolor / Mahonia repens Forest (CEGL000251)
  Abies concolor / Muhlenbergia virescens Forest (CEGL000252)
  Abies concolor / Osmorhiza berteroi Forest (CEGL000253)
  Abies concolor / Physocarpus malvaceus Forest (CEGL000254)
  Abies concolor / Quercus gambelii Forest (CEGL000261)
  Abies concolor / Symphoricarpos oreophilus Forest (CEGL000263)
- ABIES CONCOLOR WOODLAND ALLIANCE (A.553)
  Abies concolor / Cercocarpus ledifolius Woodland (CEGL000885)
  Abies concolor / Festuca arizonica Woodland (CEGL000887)
  Abies concolor / Galium triflorum Woodland (CEGL000888)
  Abies concolor / Leymus triticoides Woodland (CEGL000886)
  Abies concolor / Robinia neomexicana Woodland (CEGL000891)
- PICEA PUNGENS FOREST ALLIANCE (A.165)
  Picea pungens / Arctostaphylos uva-ursi Forest (CEGL000385)
- PICEA PUNGENS WOODLAND ALLIANCE (A.557)
  Picea pungens / Festuca arizonica Woodland (CEGL000895)
- PINUS PONDEROSA - PSEUDOTSUGA MENZIESII FOREST ALLIANCE (A.134)
  Pinus ponderosa - Pseudotsuga menziesii / Carex geyeri Forest (CEGL000211)
  Pinus ponderosa - Pseudotsuga menziesii / Physocarpus malvaceus Forest (CEGL000213)
- PINUS PONDEROSA - PSEUDOTSUGA MENZIESII WOODLAND ALLIANCE (A.533)
  Pinus ponderosa - Pseudotsuga menziesii / Arctostaphylos nevadensis Woodland (CEGL000208)
  Pinus ponderosa - Pseudotsuga menziesii / Arctostaphylos patula Woodland (CEGL000209)
  Pinus ponderosa - Pseudotsuga menziesii / Calamagrostis rubescens Woodland (CEGL000210)
  Pinus ponderosa - Pseudotsuga menziesii / Penstemon fruticosus Woodland (CEGL000212)
  Pinus ponderosa - Pseudotsuga menziesii / Pseudoroegneria spicata ssp. inermis Woodland (CEGL000207)
  Pinus ponderosa - Pseudotsuga menziesii / Purshia tridentata Woodland (CEGL000214)
- PSEUDOTSUGA MENZIESII FOREST ALLIANCE (A.157)
  Pseudotsuga menziesii / Amelanchier alnifolia Forest (CEGL000420)
  Pseudotsuga menziesii / Arctostaphylos patula Forest (CEGL000423)
  Pseudotsuga menziesii / Arctostaphylos uva-ursi - Purshia tridentata Forest (CEGL000426)
  Pseudotsuga menziesii / Arctostaphylos uva-ursi Forest (CEGL000424)
  Pseudotsuga menziesii / Arnica cordifolia Forest (CEGL000427)
  Pseudotsuga menziesii / Bromus ciliatus Forest (CEGL000428)
  Pseudotsuga menziesii / Calamagrostis rubescens Forest (CEGL000429)
  Pseudotsuga menziesii / Carex geyeri Forest (CEGL000430)
  Pseudotsuga menziesii / Carex rossii Forest (CEGL000431)

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Pseudotsuga menziesii / Festuca arizonica Forest (CEGL000433)
Pseudotsuga menziesii / Jamesia americana Forest (CEGL000438)
Pseudotsuga menziesii / Juniperus communis Forest (CEGL000439)
Pseudotsuga menziesii / Juniperus osteosperma Forest (CEGL000440)
Pseudotsuga menziesii / Linnaea borealis Forest (CEGL000441)
Pseudotsuga menziesii / Mahonia repens Forest (CEGL000442)
Pseudotsuga menziesii / Muhlenbergia montana Forest (CEGL000443)
Pseudotsuga menziesii / Muhlenbergia virescens Forest (CEGL000444)
Pseudotsuga menziesii / Osmorhiza berteroi Forest (CEGL000445)
Pseudotsuga menziesii / Paxistima myrsinites Forest (CEGL000446)
Pseudotsuga menziesii / Physocarpus malvaceus - Linnaea borealis Forest (CEGL000448)
Pseudotsuga menziesii / Physocarpus malvaceus Forest (CEGL000447)
Pseudotsuga menziesii / Physocarpus monogynus Forest (CEGL000449)
Pseudotsuga menziesii / Quercus arizonica Forest (CEGL000451)
Pseudotsuga menziesii / Quercus gambelii Forest (CEGL000452)
Pseudotsuga menziesii / Quercus hypoleucoides Forest (CEGL000453)
Pseudotsuga menziesii / Quercus rugosa Forest (CEGL000454)
Pseudotsuga menziesii / Quercus X pauciloba Forest (CEGL000455)
Pseudotsuga menziesii / Spiraea betulifolia Forest (CEGL000457)
Pseudotsuga menziesii / Symphoricarpos albus Forest (CEGL000459)
Pseudotsuga menziesii / Symphoricarpos occidentalis Forest (CEGL000461)
Pseudotsuga menziesii / Symphoricarpos oreophilus Forest (CEGL000462)
Pseudotsuga menziesii / Vaccinium caespitosum Forest (CEGL000465)
Pseudotsuga menziesii / Vaccinium spp. Forest (CEGL000464)

- PSEUDOTSUGA MENZIESII WOODLAND ALLIANCE (A.552)
  Pseudotsuga menziesii - Pinus flexilis / Leucopoa kingii Woodland (CEGL000906)
  Pseudotsuga menziesii / Cercocarpus ledifolius Woodland (CEGL000897)
  Pseudotsuga menziesii / Cercocarpus montanus Woodland (CEGL000898)
  Pseudotsuga menziesii / Festuca campestris Woodland (CEGL000901)
  Pseudotsuga menziesii / Festuca idahoensis Woodland (CEGL000900)
  Pseudotsuga menziesii / Holodiscus dumosus Scree Woodland (CEGL000902)
  Pseudotsuga menziesii / Juniperus scopulorum Woodland (CEGL000903)
  Pseudotsuga menziesii / Leucopoa kingii Woodland (CEGL000904)
  Pseudotsuga menziesii / Pseudoroegneria spicata Woodland (CEGL000908)
  Pseudotsuga menziesii / Purshia tridentata Woodland (CEGL000909)

**Vegetation:** This highly variable ecological system is comprised of mixed conifer forests at montane elevations throughout the Intermountain region. The four main alliances in this system are found on slightly different, but intermingled, biophysical environments: *Abies concolor* dominates at higher, colder locations; *Picea pungens* represents mesic conditions; *Pseudotsuga menziesii* dominates intermediate zones. As many as seven conifers can be found growing in the same occurrences, with the successful reproduction of the diagnostic species determining the association type. Common conifers include *Pinus ponderosa, Pinus flexilis, Abies lasiocarpa var. lasiocarpa, Abies lasiocarpa var. arizonica, Juniperus scopulorum*, and *Picea engelmannii*. *Populus tremuloides* is often present as intermingled individuals in remnant aspen clones, or in adjacent patches. The composition and structure of overstory is dependent upon the temperature and moisture relationships of the site, and the successional status of the occurrence (DeVelice et al. 1986, Muldavin et al. 1996).

A number of cold-deciduous shrub and graminoid species are found in many occurrences (e.g., *Arctostaphylos uva-ursi, Mahonia repens, Paxistima myrsinites, Symphoricarpos oreophilus, Jamesia americana, Quercus gambelii*, and *Festuca arizonica*). Other important species include *Acer glabrum, Acer grandidentatum, Amelanchier alnifolia, Arctostaphylos patula, Holodiscus dumosus, Jamesia americana, Juniperus communis, Physocarpus monogynus, Quercus arizonica, Quercus rugosa, Quercus X pauciloba, Quercus hypoleucoides, Robinia neomexicana, Rubus parviflorus*, and *Vaccinium myrtillus*. Where soil moisture is favorable, the herbaceous layer may be quite diverse, including graminoids *Bromus ciliatus (= Bromus canadensis), Calamagrostis rubescens, Carex geyeri, Carex rossii, Carex siccata (= Carex foenea), Festuca occidentalis, Koeleria macrantha, Muhlenbergia montana, Muhlenbergia virescens, Poa fendleriana, Pseudoroegneria spicata*, and forbs *Achillea millefolium, Arnica cordifolia, Erigeron eximius, Fragaria virginiana, Linnaea borealis, Luzula parviflora, Osmorhiza berteroi, Packera cardamine (= Senecio cardamine), Thalictrum occidentale, Thalictrum fendleri, Thermopsis rhombifolia, Viola adunca*, and species of many other genera, including *Lathyrus, Penstemon, Lupinus, Vicia, Arenaria, Galium*, and others.

**Dynamics:** Forests in this ecological system represent the gamut of fire tolerance. Formerly, *Abies concolor* in the Utah High Plateaus were restricted to rather moist or less fire-prone areas by frequent ground fires. These areas experienced mixed fire severities, with patches of crowning in which all trees are killed, intermingled with patches of underburn in which larger *Abies concolor* survived (www.fs.fed.us/database/feis/). With fire suppression, *Abies concolor* has vigorously colonized many sites formerly occupied by open *Pinus ponderosa* woodlands. These invasions have dramatically changed the fuel load



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and potential behavior of fire in these forests. In particular, the potential for high-intensity crown fires on drier sites now codominated by *Pinus ponderosa* and *Abies concolor* has increased. Increased landscape connectivity, in terms of fuel loadings and crown closure, has also increased the potential size of crown fires.

*Pseudotsuga menziesii* forests are the only true 'fire-tolerant' occurrences in this ecological system. *Pseudotsuga menziesii* forests were probably subject to a moderate-severity fire regime in presettlement times, with fire-return intervals of 30-100 years. Many of the important tree species in these forests are fire-adapted (*Populus tremuloides, Pinus ponderosa, Pinus contorta*) (Pfister et al. 1977), and fire-induced reproduction of *Pinus ponderosa* can result in its continued codominance in *Pseudotsuga menziesii* forests (Steele et al. 1981). Seeds of the shrub *Ceanothus velutinus* can remain dormant in forest occurrences for 200 years (Steele et al. 1981) and germinate abundantly after fire, competitively suppressing conifer seedlings. Successional relationships in this system are complex. *Pseudotsuga menziesii* is less shade-tolerant than many northern or montane trees such as *Tsuga heterophylla, Abies concolor, Picea engelmannii*, and seedlings compete poorly in deep shade. At drier locales, seedlings may be favored by moderate shading, such as by a canopy of *Pinus ponderosa*, which helps to minimize drought stress. In some locations, much of these forests have been logged or burned during European settlement, and present-day occurrences are second-growth forests dating from fire, logging, or other occurrence-replacing disturbances (Mauk and Henderson 1984, Chappell et al. 1997).

*Picea pungens* is a slow-growing, long-lived tree which regenerates from seed (Burns and Honkala 1990a). Seedlings are shallow-rooted and require perennially moist soils for establishment and optimal growth. *Picea pungens* is intermediate in shade tolerance, being somewhat more tolerant than *Pinus ponderosa* or *Pseudotsuga menziesii*, and less tolerant than *Abies lasiocarpa* or *Picea engelmannii*. It forms late-seral occurrences in the subhumid regions of the Utah High Plateaus. It is common for these forests to be heavily disturbed by grazing or fire.

In general, fire suppression has lead to the encroachment of more shade-tolerant, less fire-tolerant species (e.g., climax) into occurrences and an attendant increase in landscape homogeneity and connectivity (from a fuels perspective). This has increased the lethality and potential size of fires.

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.825 ROCKY MOUNTAIN MONTANE MESIC MIXED CONIFER FOREST AND WOODLAND

Division 306,

**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** These are mixed-conifer forests of the Rocky Mountains west into the ranges of the Great Basin, occurring predominantly in cool ravines and on north-facing slopes. Elevations range from 1200 to 3300 m. Occurrences of this system are found on cooler and more mesic sites than Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland (CES306.823). Such sites include lower and middle slopes of ravines, along stream terraces, moist, concave topographic positions and north- and east-facing slopes which burn somewhat infrequently. *Pseudotsuga menziesii* and *Abies concolor* are most common canopy dominants, but *Picea engelmannii, Picea pungens*, or *Pinus ponderosa* may be present. This system includes mixed conifer/*Populus tremuloides* stands. A number of cold-deciduous shrub species can occur, including *Acer glabrum, Acer grandidentatum, Alnus incana, Betula occidentalis, Cornus sericea, Jamesia americana, Physocarpus malvaceus, Robinia neomexicana, Vaccinium membranaceum*, and *Vaccinium myrtillus*. Herbaceous species include *Bromus ciliatus, Carex geyeri, Carex rossii, Carex siccata, Muhlenbergia virescens, Pseudoroegneria spicata, Erigeron eximius, Fragaria virginiana, Luzula parviflora, Osmorhiza berteroi, Packera cardamine, Thalictrum occidentale*, and *Thalictrum fendleri*. Naturally occurring fires are of variable return intervals, and mostly light, erratic, and infrequent due to the cool, moist conditions.

**Comments:** This system will need to be modeled to separate from similar dry-mesic system.

### DISTRIBUTION

**Range:** Rocky Mountains west into the ranges of the Great Basin, occurring predominantly in cool ravines and on north-facing slopes. Elevations range from 1200 to 3300 m.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ABIES CONCOLOR FOREST ALLIANCE (A.152)
  Abies concolor - Picea pungens - Populus angustifolia / Acer glabrum Forest (CEGL000255)
  Abies concolor - Pinus ponderosa / Cercocarpus ledifolius Forest (CEGL002732)



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Abies concolor - Pseudotsuga menziesii / Acer glabrum Forest (CEGL000240)
Abies concolor - Pseudotsuga menziesii / Erigeron eximius Forest (CEGL000247)
Abies concolor - Pseudotsuga menziesii / Lathyrus lanszwertii var. leucanthus Forest (CEGL000250)
Abies concolor - Pseudotsuga menziesii / Vaccinium myrtillus Forest (CEGL000265)
Abies concolor / Acer grandidentatum Forest (CEGL000241)
Abies concolor / Arctostaphylos patula Forest (CEGL000242)
Abies concolor / Arctostaphylos uva-ursi Forest (CEGL000243)
Abies concolor / Carex siccata Forest (CEGL000244)
Abies concolor / Juglans major Forest (CEGL000248)
Abies concolor / Mahonia repens Forest (CEGL000251)
Abies concolor / Muhlenbergia virescens Forest (CEGL000252)
Abies concolor / Osmorhiza berteroi Forest (CEGL000253)
Abies concolor / Physocarpus malvaceus Forest (CEGL000254)
Abies concolor / Quercus gambelii Forest (CEGL000261)
Abies concolor / Symphoricarpos oreophilus Forest (CEGL000263)

- ABIES CONCOLOR WOODLAND ALLIANCE (A.553)
  Abies concolor / Festuca arizonica Woodland (CEGL000887)
  Abies concolor / Galium triflorum Woodland (CEGL000888)
  Abies concolor / Holodiscus dumosus Scree Woodland (CEGL000889)
  Abies concolor / Jamesia americana Scree Woodland (CEGL000890)
  Abies concolor / Leymus triticoides Woodland (CEGL000886)
  Abies concolor / Robinia neomexicana Woodland (CEGL000891)
- PICEA PUNGENS FOREST ALLIANCE (A.165)
  Picea pungens / Arctostaphylos uva-ursi Forest (CEGL000385)
  Picea pungens / Arnica cordifolia Forest (CEGL000386)
  Picea pungens / Carex siccata Forest (CEGL000387)
  Picea pungens / Erigeron eximius Forest (CEGL000390)
  Picea pungens / Fragaria virginiana ssp. virginiana Forest (CEGL000391)
  Picea pungens / Juniperus communis Forest (CEGL000392)
  Picea pungens / Linnaea borealis Forest (CEGL000393)
  Picea pungens / Lonicera involucrata Forest (CEGL000394)
  Picea pungens / Mahonia repens Forest (CEGL000395)
  Picea pungens / Packera cardamine Forest (CEGL000399)
  Picea pungens / Pseudoroegneria spicata Forest (CEGL000397)
- PICEA PUNGENS TEMPORARILY FLOODED WOODLAND ALLIANCE (A.567)
  Picea pungens / Alnus incana Woodland (CEGL000894)
  Picea pungens / Betula occidentalis Woodland (CEGL002637)
  Picea pungens / Cornus sericea Woodland (CEGL000388)
  Picea pungens / Dasiphora fruticosa ssp. floribunda Woodland (CEGL000396)
  Picea pungens / Equisetum arvense Woodland (CEGL000389)
  Picea pungens / Rosa woodsii Woodland (CEGL000398)
- PICEA PUNGENS WOODLAND ALLIANCE (A.557)
  Picea pungens / Festuca arizonica Woodland (CEGL000895)
- PSEUDOTSUGA MENZIESII FOREST ALLIANCE (A.157)
  Pseudotsuga menziesii / Acer glabrum Forest (CEGL000418)
  Pseudotsuga menziesii / Acer grandidentatum Forest (CEGL000419)
  Pseudotsuga menziesii / Bromus ciliatus Forest (CEGL000428)
  Pseudotsuga menziesii / Vaccinium membranaceum Forest (CEGL000466)
  Pseudotsuga menziesii / Viola adunca var. adunca Forest (CEGL000467)
- PSEUDOTSUGA MENZIESII TEMPORARILY FLOODED WOODLAND ALLIANCE (A.568)
  Pseudotsuga menziesii / Betula occidentalis Woodland (CEGL002639)
  Pseudotsuga menziesii / Cornus sericea Woodland (CEGL000899)

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.827 ROCKY MOUNTAIN PONDEROSA PINE WOODLAND

Division 306,

**Spatial Scale & Pattern:** Matrix **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This very widespread ecological system is most common throughout the cordillera of the Rocky Mountains. It is also found in the Colorado Plateau region, west into scattered locations in the Great Basin, and north into



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southern British Columbia. These woodlands occur at the lower treeline/ecotone between grassland or shrubland and more mesic coniferous forests typically in warm, dry, exposed sites. Elevations range from less than 500 m in British Columbia to 2800 m in the New Mexico mountains. Occurrences are found on all slopes and aspects, however, moderately steep to very steep slopes or ridgetops are most common. This ecological system generally occurs on igneous, metamorphic, and sedimentary material derived soils, with characteristic features of good aeration and drainage, coarse textures, circumneutral to slightly acid pH, an abundance of mineral material, rockiness, and periods of drought during the growing season. These woodlands in the eastern Cascades, Okanagan and northern Rockies regions receive winter and spring rains, and thus have a greater spring "green-up" than the drier woodlands in the central Rockies. *Pinus ponderosa* is the predominant conifer; *Pseudotsuga menziesii, Pinus edulis*, and *Juniperus* spp. may be present in the tree canopy. The understory is usually shrubby, with *Artemisia nova, Artemisia tridentata, Arctostaphylos patula, Arctostaphylos uva-ursi, Cercocarpus montanus, Cercocarpus ledifolius, Purshia stansburiana, Purshia tridentata, Quercus gambelii, Symphoricarpos oreophilus, Prunus virginiana, Amelanchier alnifolia*, and *Rosa* spp. common species. *Pseudoroegneria spicata* and species of *Hesperostipa, Achnatherum, Festuca, Muhlenbergia*, and *Bouteloua* are some of the common grasses. Mixed fire regimes and ground fires of variable return interval maintain these woodlands, depending on climate, degree of soil development, and understory density.

**Comments:** This system intergrades with Rocky Mountain Ponderosa Pine Savanna (CES306.826). They are distinguished by the high frequency, surface-fire regime, less steep or rocky environmental setting, and more open grassy understory structure of the savanna system.

### DISTRIBUTION

**Range:** Throughout the cordillera of the Rocky Mountains, Colorado Plateau region, west into scattered locations in the Great Basin, and north into southern British Columbia.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- PINUS PONDEROSA FOREST ALLIANCE (A.124)
  Pinus ponderosa - Pinus strobiformis Forest (CEGL007091)
  Pinus ponderosa / Arctostaphylos patula - Arctostaphylos viscida Forest (CEGL000061)
  Pinus ponderosa / Calamagrostis rubescens Forest (CEGL000181)
  Pinus ponderosa / Carex rossii Forest (CEGL000183)
  Pinus ponderosa / Elymus glaucus Forest (CEGL000184)
  Pinus ponderosa / Mahonia repens Forest (CEGL000187)
  Pinus ponderosa / Physocarpus malvaceus Forest (CEGL000189)
  Pinus ponderosa / Physocarpus monogynus Forest (CEGL000190)
  Pinus ponderosa / Prunus virginiana Forest (CEGL000192)
  Pinus ponderosa / Ribes cereum Forest (CEGL000199)
  Pinus ponderosa / Spiraea betulifolia Forest (CEGL000202)
  Pinus ponderosa / Symphoricarpos albus Forest (CEGL000203)
  Pinus ponderosa / Symphoricarpos occidentalis Forest (CEGL000204)
  Pinus ponderosa / Symphoricarpos oreophilus Forest (CEGL000205)
- PINUS PONDEROSA WOODLAND ALLIANCE (A.530)
  Pinus ponderosa / Amelanchier alnifolia Woodland (CEGL000840)
  Pinus ponderosa / Arctostaphylos patula - Ceanothus velutinus Woodland (CEGL000062)
  Pinus ponderosa / Arctostaphylos patula - Purshia tridentata Woodland (CEGL000063)
  Pinus ponderosa / Arctostaphylos patula Woodland (CEGL000842)
  Pinus ponderosa / Arctostaphylos pungens Woodland (CEGL000843)
  Pinus ponderosa / Arctostaphylos uva-ursi Woodland (CEGL000844)
  Pinus ponderosa / Artemisia arbuscula Woodland (CEGL000845)
  Pinus ponderosa / Artemisia nova Woodland (CEGL000846)
  Pinus ponderosa / Artemisia tridentata - Purshia tridentata Woodland (CEGL000178)
  Pinus ponderosa / Artemisia tridentata ssp. vaseyana / Poa nervosa Woodland (CEGL000180)
  Pinus ponderosa / Artemisia tridentata ssp. wyomingensis / Hesperostipa comata Woodland (CEGL000179)
  Pinus ponderosa / Bouteloua gracilis Woodland (CEGL000848)
  Pinus ponderosa / Bromus inermis Semi-natural Woodland (CEGL002943)
  Pinus ponderosa / Carex geyeri Woodland (CEGL000182)
  Pinus ponderosa / Carex inops ssp. heliophila Woodland (CEGL000849)
  Pinus ponderosa / Ceanothus velutinus - Purshia tridentata Woodland (CEGL000064)
  Pinus ponderosa / Cercocarpus ledifolius Woodland (CEGL000850)
  Pinus ponderosa / Cercocarpus montanus Woodland (CEGL000851)
  Pinus ponderosa / Fallugia paradoxa Woodland (CEGL002999)
  Pinus ponderosa / Festuca arizonica Woodland (CEGL000856)



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Pinus ponderosa / Festuca campestris Woodland (CEGL000185)
Pinus ponderosa / Festuca idahoensis Woodland (CEGL000857)
Pinus ponderosa / Hesperostipa comata Woodland (CEGL000879)
Pinus ponderosa / Juniperus communis Woodland (CEGL000859)
Pinus ponderosa / Juniperus horizontalis Woodland (CEGL000860)
Pinus ponderosa / Juniperus scopulorum Woodland (CEGL000861)
Pinus ponderosa / Leucopoa kingii Woodland (CEGL000186)
Pinus ponderosa / Muhlenbergia montana Woodland (CEGL000862)
Pinus ponderosa / Muhlenbergia virescens - Festuca arizonica Woodland (CEGL000864)
Pinus ponderosa / Muhlenbergia virescens Woodland (CEGL000863)
Pinus ponderosa / Oryzopsis asperifolia Woodland (CEGL002123)
Pinus ponderosa / Pascopyrum smithii Woodland (CEGL000188)
Pinus ponderosa / Pseudoroegneria spicata Woodland (CEGL000865)
Pinus ponderosa / Pteridium aquilinum Woodland (CEGL002944)
Pinus ponderosa / Purshia stansburiana Woodland (CEGL000854)
Pinus ponderosa / Purshia tridentata / Achnatherum hymenoides Woodland (CEGL000196)
Pinus ponderosa / Purshia tridentata / Carex geyeri Woodland (CEGL002606)
Pinus ponderosa / Purshia tridentata / Carex rossii Woodland (CEGL000194)
Pinus ponderosa / Purshia tridentata / Festuca idahoensis Woodland (CEGL000195)
Pinus ponderosa / Purshia tridentata / Pseudoroegneria spicata Woodland (CEGL000197)
Pinus ponderosa / Purshia tridentata Woodland (CEGL000867)
Pinus ponderosa / Quercus gambelii Woodland (CEGL000870)
Pinus ponderosa / Quercus macrocarpa Woodland (CEGL000873)
Pinus ponderosa / Quercus X pauciloba Woodland (CEGL000874)
Pinus ponderosa / Ribes inerme Scree Woodland (CEGL000876)
Pinus ponderosa / Rockland Woodland (CEGL000877)
Pinus ponderosa / Schizachyrium scoparium Woodland (CEGL000201)
Pinus ponderosa Scree Woodland (CEGL000878)

**Environment:** This ecological system within the region occurs at the lower treeline/ecotone between grassland or shrubland and more mesic coniferous forests typically in warm, dry, exposed sites at elevations ranging from 1980-2800 m. (6500-9200 feet). It can occur on all slopes and aspects, however, it commonly occurs on moderately steep to very steep slopes or ridgetops. This ecological system generally occurs on igneous, metamorphic, and sedimentary material derived soils, including basalt, basaltic, andesitic flows, intrusive granitoids and porphyrites, and tuffs (Youngblood and Mauk 1985). Characteristic soil features include good aeration and drainage, coarse textures, circumneutral to slightly acid pH, an abundance of mineral material, and periods of drought during the growing season. Some occurrences may occur as edaphic climax communities on very skeletal, infertile, and/or excessively drained soils, such as pumice, cinder or lava fields, and scree slopes.

Surface textures are highly variable in this ecological system ranging from sand to loam and silt loam. Exposed rock and bare soil consistently occur to some degree in all the associations. *Pinus ponderosa / Arctostaphylos patula* represents the extreme with typically a high percentage of rock and bare soil present.

Precipitation generally contributes 25-60 cm annually to this system, mostly through winter storms and some monsoonal summer rains. Typically a seasonal drought period occurs throughout this system as well. Fire plays an important role in maintaining the characteristics of these open canopy woodlands. However, soil infertility and drought may contribute significantly in some areas as well.

**Dynamics:** *Pinus ponderosa* is a drought-resistant, shade-intolerant conifer which usually occurs at lower treeline in the major ranges of the western United States. Historically, ground fires and drought were influential in maintaining open-canopy conditions in these woodlands. With settlement and subsequent fire suppression, occurrences have become denser. Presently, many occurrences contain understories of more shade-tolerant species, such as *Pseudotsuga menziesii* and/or *Abies* spp., as well as younger cohorts of *Pinus ponderosa*. These altered occurrence structures have affected fuel loads and alter fire regimes. Presettlement fire regimes were primarily frequent (5-15 year return intervals), low-intensity ground fires triggered by lightning strikes or deliberately set fires by Native Americans. With fire suppression and increased fuel loads, fire regimes are now less frequent and often become intense crown fires, which can kill mature *Pinus ponderosa* (Reid et al. 1999).

Establishment is erratic and believed to be linked to periods of adequate soil moisture and good seed crops as well as fire frequencies, which allow seedlings to reach sapling size. Longer fire-return intervals have resulted in many occurrences having dense subcanopies of overstocked and unhealthy young *Pinus ponderosa* (Reid et al. 1999).

Mehl (1992) states the following: "Where fire has been present, occurrences will be climax and contain groups of large, old trees with little understory vegetation or down woody material and few occurring dead trees. The age difference of the groups of trees would be large. Where fire is less frequent there will also be smaller size trees in the understory giving the occurrence some structure with various canopy layers. Dead, down material will be present in varying amounts along with



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some occurring dead trees. In both cases the large old trees will have irregular open, large branched crowns. The bark will be lighter in color, almost yellow, thick and some will like have basal fire scars."

Grace's warbler, Pygmy nuthatch, and flammulated owl are indicators of a healthy ponderosa pine woodland. All of these birds prefer mature trees in an open woodland setting (Winn 1998, Jones 1998, Levad 1998 as cited in Rondeau 2001).

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.828 ROCKY MOUNTAIN SUBALPINE DRY-MESIC SPRUCE-FIR FOREST AND WOODLAND

Division 306,

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**Spatial Scale & Pattern:** Matrix **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** Engelmann spruce and subalpine fir forests comprise a substantial part of the subalpine forests of the Cascades and Rocky Mountains from southern British Columbia east into Alberta, south into New Mexico and the Intermountain region. They are the matrix forests of the subalpine zone, with elevations ranging from 1525 to 3355 m (5000-11,000 feet). Sites within this system are cold year-round, and precipitation is predominantly in the form of snow, which may persist until late summer. Snowpacks are deep and late-lying, and summers are cool. Frost is possible almost all summer and may be common in restricted topographic basins and benches. Despite their wide distribution, the tree canopy characteristics are remarkably similar, with *Picea engelmannii* and *Abies lasiocarpa* dominating either mixed or alone. *Pinus contorta* is common in many occurrences and patches of pure *Pinus contorta* are not uncommon, as well as mixed conifer/*Populus tremuloides* stands. In some areas, such as Wyoming, *Picea engelmannii*-dominated forests are on limestone or dolomite, while nearby codominated spruce-fir forests are on granitic or volcanic rocks. Xeric species may include *Juniperus communis, Linnaea borealis, Mahonia repens*, or *Vaccinium scoparium*. Disturbance includes occasional blow-down, insect outbreaks and stand-replacing fire.

**DISTRIBUTION**

**Range:** Cascades and Rocky Mountains from southern British Columbia east into Alberta, south into New Mexico and the Intermountain region.
**Ecological Divisions:**

**CONCEPT**

**Alliances and Associations:**

- ABIES LASIOCARPA FOREST ALLIANCE (A.168)
  Abies lasiocarpa - Picea engelmannii Tree Island Forest (CEGL000329)
  Abies lasiocarpa / Arnica cordifolia Forest (CEGL000298)
  Abies lasiocarpa / Arnica latifolia Forest (CEGL000299)
  Abies lasiocarpa / Calamagrostis rubescens Forest (CEGL000301)
  Abies lasiocarpa / Carex rossii Forest (CEGL000305)
  Abies lasiocarpa / Carex siccata Forest (CEGL000303)
  Abies lasiocarpa / Clintonia uniflora Forest (CEGL000307)
  Abies lasiocarpa / Galium triflorum Forest (CEGL000311)
  Abies lasiocarpa / Jamesia americana Forest (CEGL000312)
  Abies lasiocarpa / Lathyrus lanszwertii var. leucanthus Forest (CEGL000313)
  Abies lasiocarpa / Linnaea borealis Forest (CEGL000315)
  Abies lasiocarpa / Mahonia repens Forest (CEGL000318)
  Abies lasiocarpa / Menziesia ferruginea Forest (CEGL000319)
  Abies lasiocarpa / Osmorhiza berteroi Forest (CEGL000323)
  Abies lasiocarpa / Packera sanguisorboides Forest (CEGL000333)
  Abies lasiocarpa / Pedicularis racemosa Forest (CEGL000325)
  Abies lasiocarpa / Physocarpus malvaceus Forest (CEGL000326)
  Abies lasiocarpa / Ribes (montigenum, lacustre, inerme) Forest (CEGL000331)
  Abies lasiocarpa / Spiraea betulifolia Forest (CEGL000335)
  Abies lasiocarpa / Symphoricarpos albus Forest (CEGL000337)
  Abies lasiocarpa / Thalictrum occidentale Forest (CEGL000338)
  Abies lasiocarpa / Vaccinium caespitosum Forest (CEGL000340)
  Abies lasiocarpa / Vaccinium membranaceum Forest (CEGL000342)
  Abies lasiocarpa / Vaccinium membranaceum Rocky Mountain Forest (CEGL000341)
  Abies lasiocarpa / Vaccinium myrtillus Forest (CEGL000343)
  Abies lasiocarpa / Vaccinium scoparium Forest (CEGL000344)
  Abies lasiocarpa / Xerophyllum tenax Forest (CEGL000346)



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- ABIES LASIOCARPA KRUMMHOLZ SHRUBLAND ALLIANCE (A.811)
  Abies lasiocarpa Krummholz Shrubland (CEGL000985)
- ABIES LASIOCARPA WOODLAND ALLIANCE (A.559)
  Abies lasiocarpa / Juniperus communis Woodland (CEGL000919)
  Abies lasiocarpa / Paxistima myrsinites Woodland (CEGL000324)
  Abies lasiocarpa / Saxifraga bronchialis Scree Woodland (CEGL000924)
  Abies lasiocarpa Scree Woodland (CEGL000925)
- PICEA ENGELMANNII FOREST ALLIANCE (A.164)
  Picea (engelmannii X glauca, engelmannii) / Clintonia uniflora Forest (CEGL000406)
  Picea (engelmannii X glauca, engelmannii) / Juniperus communis Forest (CEGL000410)
  Picea (engelmannii X glauca, engelmannii) / Vaccinium caespitosum Forest (CEGL000416)
  Picea engelmannii / Arnica cordifolia Forest (CEGL000355)
  Picea engelmannii / Clintonia uniflora Forest (CEGL000360)
  Picea engelmannii / Erigeron eximius Forest (CEGL000364)
  Picea engelmannii / Geum rossii Forest (CEGL000366)
  Picea engelmannii / Juniperus communis Forest (CEGL000369)
  Picea engelmannii / Leymus triticoides Forest (CEGL000362)
  Picea engelmannii / Linnaea borealis Forest (CEGL002689)
  Picea engelmannii / Polemonium pulcherrimum Forest (CEGL000373)
  Picea engelmannii / Ribes montigenum Forest (CEGL000374)
  Picea engelmannii / Trifolium dasyphyllum Forest (CEGL000377)
  Picea engelmannii / Vaccinium caespitosum Forest (CEGL000378)
  Picea engelmannii / Vaccinium myrtillus Forest (CEGL000379)
  Picea engelmannii / Vaccinium scoparium Forest (CEGL000381)
- PICEA ENGELMANNII SEASONALLY FLOODED FOREST ALLIANCE (A.191)
  Picea (engelmannii X glauca, engelmannii) / Packera streptanthifolia Forest (CEGL000414)
- PICEA ENGELMANNII TEMPORARILY FLOODED FOREST ALLIANCE (A.179)
  Picea (engelmannii X glauca, engelmannii) / Galium triflorum Forest (CEGL000409)
  Picea engelmannii / Galium triflorum Forest (CEGL000365)

**Dynamics:** *Picea engelmannii* can be very long-lived, reaching 500 years of age. *Abies lasiocarpa* decreases in importance relative to *Picea engelmannii* with increasing distance from the region of Montana and Idaho where maritime air masses influence the climate. Fire is an important disturbance factor, but fire regimes have a long return interval and so are often stand-replacing. *Picea engelmannii* can rapidly recolonize and dominate burned sites, or can succeed other species such as *Pinus contorta* or *Populus tremuloides*. Due to great longevity, *Pseudotsuga menziesii* may persist in occurrences of this system for long periods without regeneration. Old-growth characteristics in *Picea engelmannii* forests will include treefall and windthrow gaps in the canopy, with large downed logs, rotting woody material, tree seedling establishment on logs or on mineral soils unearthed in root balls, and snags.

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.829 ROCKY MOUNTAIN SUBALPINE MESIC MEADOW

Division 306,

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**Spatial Scale & Pattern:** Small Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This Rocky Mountain ecological system is restricted to sites in the subalpine zone where finely textured soils, snow deposition, or wind-swept dry conditions limit tree establishment. It is found typically above 3000 m in elevation in the southern part of its range and above 1500 m in the northern part. These upland communities occur on gentle to moderate-gradient slopes. The soils are typically seasonally moist to saturated in the spring, but if so will dry out later in the growing season. They are not as wet as found in Rocky Mountain Alpine-Montane Wet Meadow (CES306.812). Vegetation is typically forb-rich, with forbs contributing more to overall herbaceous cover than graminoids. Important taxa include *Erigeron* spp., Asteraceae spp., *Mertensia* spp., *Penstemon* spp., *Campanula* spp., *Lupinus* spp., *Solidago* spp., *Ligusticum* spp., *Thalictrum occidentale, Valeriana sitchensis, Balsamorhiza sagittata, Wyethia* spp., *Deschampsia caespitosa, Koeleria macrantha*, and *Dasiphora fruticosa*. Burrowing mammals can increase the forb diversity.

**DISTRIBUTION**

**Range:** Rocky Mountains.
**Ecological Divisions:**



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### CONCEPT

**Alliances and Associations:**

- AGASTACHE URTICIFOLIA HERBACEOUS ALLIANCE (A.1602)
  Agastache urticifolia - Heliomeris multiflora Herbaceous Vegetation (CEGL001937)
- ANTENNARIA MICROPHYLLA HERBACEOUS ALLIANCE (A.1623)
  Antennaria microphylla - Artemisia scopulorum Herbaceous Vegetation (CEGL001847)
- DESCHAMPSIA CAESPITOSA SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1408)
  Deschampsia caespitosa - Ligusticum tenuifolium Herbaceous Vegetation (CEGL001885)
- DESCHAMPSIA CAESPITOSA TEMPORARILY FLOODED HERBACEOUS ALLIANCE (A.1355)
  Deschampsia caespitosa - Achillea millefolium var. occidentalis Herbaceous Vegetation (CEGL001880)
  Deschampsia caespitosa - Geum rossii Herbaceous Vegetation (CEGL001884)
  Deschampsia caespitosa - Mertensia ciliata Herbaceous Vegetation (CEGL001887)
  Deschampsia caespitosa - Phleum alpinum Herbaceous Vegetation (CEGL001888)
  Deschampsia caespitosa - Potentilla diversifolia Herbaceous Vegetation (CEGL001889)
  Deschampsia caespitosa - Symphyotrichum foliaceum Herbaceous Vegetation (CEGL001881)
- GEUM ROSSII HERBACEOUS ALLIANCE (A.1645)
  Geum rossii - Trifolium spp. Herbaceous Vegetation (CEGL001970)
- IVESIA GORDONII HERBACEOUS ALLIANCE (A.1627)
  Ivesia gordonii - Eriogonum caespitosum Herbaceous Vegetation (CEGL001903)
  Ivesia gordonii - Minuartia obtusiloba Herbaceous Vegetation (CEGL001902)
- LIGUSTICUM FILICINUM HERBACEOUS ALLIANCE (A.1604)
  Ligusticum filicinum - Delphinium X occidentale Herbaceous Vegetation (CEGL001941)
- LIGUSTICUM PORTERI HERBACEOUS ALLIANCE (A.1601)
  Ligusticum porteri - Lupinus parviflorus ssp. myrianthus Herbaceous Vegetation (CEGL001915)
  Ligusticum porteri - Vicia americana Herbaceous Vegetation (CEGL001916)
- LIGUSTICUM TENUIFOLIUM HERBACEOUS ALLIANCE (A.1628)
  Ligusticum tenuifolium - Trollius laxus ssp. albiflorus Herbaceous Vegetation (CEGL001917)
- LUPINUS ARGENTEUS HERBACEOUS ALLIANCE (A.1605)
  Lupinus argenteus - Fragaria virginiana Herbaceous Vegetation (CEGL001942)
  Lupinus spp. - Poa spp. Herbaceous Vegetation (CEGL001943)
- MERTENSIA CILIATA HERBACEOUS ALLIANCE (A.1606)
  Mertensia ciliata Herbaceous Vegetation (CEGL001944)
- PHLEUM ALPINUM HERBACEOUS ALLIANCE (A.1310)
  Phleum alpinum - Achillea millefolium Herbaceous Vegetation (CEGL001920)
- TRIFOLIUM DASYPHYLLUM HERBACEOUS ALLIANCE (A.1637)
  Trifolium dasyphyllum Herbaceous Vegetation (CEGL001935)
- TRIFOLIUM PARRYI HERBACEOUS ALLIANCE (A.1638)
  Trifolium parryi Herbaceous Vegetation (CEGL001936)
- WYETHIA AMPLEXICAULIS HERBACEOUS ALLIANCE (A.1607)
  Wyethia amplexicaulis Herbaceous Vegetation (CEGL001947)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.830 ROCKY MOUNTAIN SUBALPINE MESIC SPRUCE-FIR FOREST AND WOODLAND

Division 306,

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This is a high-elevation system of the Rocky Mountains, dominated by *Picea engelmannii* and *Abies lasiocarpa*. Occurrences are typically found in locations with cold-air drainage or ponding, or where snowpacks linger late into the summer, such as north-facing slopes and high-elevation ravines. They can extend down in elevation below the subalpine zone in places where cold-air ponding occurs; northerly and easterly aspects predominate. These forests are found on gentle to very steep mountain slopes, high-elevation ridgetops and upper slopes, plateaulike surfaces, basins, alluvial terraces, well-drained benches, and inactive stream terraces. Mesic understory shrubs include *Rhododendron albiflorum, Amelanchier alnifolia, Rubus parviflorus, Ledum glandulosum, Phyllodoce empetriformis*, and *Salix* spp. Herbaceous species include *Actaea rubra, Maianthemum stellatum, Cornus canadensis, Erigeron eximius, Saxifraga bronchialis, Luzula glabrata var. hitchcockii*, or *Calamagrostis canadensis*. Disturbances include occasional blow-down, insect outbreaks and stand-replacing fire.

### DISTRIBUTION

**Range:** High elevations of the Rocky Mountains.



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**Ecological Divisions:**

**CONCEPT**

**Alliances and Associations:**

- ABIES LASIOCARPA - POPULUS TREMULOIDES FOREST ALLIANCE (A.422)
  Populus tremuloides - Abies lasiocarpa / Amelanchier alnifolia Forest (CEGL000524)
  Populus tremuloides - Abies lasiocarpa / Carex geyeri Forest (CEGL000525)
  Populus tremuloides - Abies lasiocarpa / Juniperus communis Forest (CEGL000527)
- ABIES LASIOCARPA FOREST ALLIANCE (A.168)
  Abies lasiocarpa - Picea engelmannii Ribbon Forest (CEGL000328)
  Abies lasiocarpa / Acer glabrum Forest (CEGL000294)
  Abies lasiocarpa / Actaea rubra Forest (CEGL000295)
  Abies lasiocarpa / Carex geyeri Forest (CEGL000304)
  Abies lasiocarpa / Clematis columbiana var. columbiana Forest (CEGL000306)
  Abies lasiocarpa / Coptis occidentalis Forest (CEGL000308)
  Abies lasiocarpa / Cornus canadensis Forest (CEGL000309)
  Abies lasiocarpa / Erigeron eximius Forest (CEGL000310)
  Abies lasiocarpa / Gymnocarpium dryopteris Forest (CEGL002611)
  Abies lasiocarpa / Luzula glabrata var. hitchcockii Forest (CEGL000317)
  Abies lasiocarpa / Moss Forest (CEGL000321)
  Abies lasiocarpa / Rubus parviflorus Forest (CEGL000332)
  Abies lasiocarpa / Vaccinium membranaceum / Valeriana sitchensis Forest (CEGL002612)
  Abies lasiocarpa / Vaccinium membranaceum Forest (CEGL000342)
  Abies lasiocarpa / Vaccinium membranaceum Rocky Mountain Forest (CEGL000341)
- ABIES LASIOCARPA KRUMMHOLZ SHRUBLAND ALLIANCE (A.811)
  Abies lasiocarpa / Salix brachycarpa Shrubland (CEGL000986)
  Abies lasiocarpa / Salix glauca Shrubland (CEGL000987)
- ABIES LASIOCARPA SEASONALLY FLOODED FOREST ALLIANCE (A.190)
  Abies lasiocarpa / Calamagrostis canadensis Forest (CEGL000300)
  Abies lasiocarpa / Caltha leptosepala ssp. howellii Forest (CEGL000302)
  Abies lasiocarpa / Ledum glandulosum Forest (CEGL000314)
- ABIES LASIOCARPA WOODLAND ALLIANCE (A.559)
  Abies lasiocarpa / Phyllodoce empetriformis Woodland (CEGL000920)
  Abies lasiocarpa / Rhododendron albiflorum Woodland (CEGL000330)
- PICEA ENGELMANNII FOREST ALLIANCE (A.164)
  Picea engelmannii / Acer glabrum Forest (CEGL000354)
  Picea engelmannii / Hypnum revolutum Forest (CEGL000368)
  Picea engelmannii / Maianthemum stellatum Forest (CEGL000415)
  Picea engelmannii / Moss Forest (CEGL000371)
  Picea engelmannii / Packera cardamine Forest (CEGL000375)
  Picea engelmannii / Physocarpus malvaceus Forest (CEGL002676)

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.819 ROCKY MOUNTAIN SUBALPINE-MONTANE LIMBER-BRISTLECONE PINE WOODLAND

Division 306,

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**Spatial Scale & Pattern:** Large Patch **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Upland
**Concept Summary:** This ecological system occurs throughout the Rocky Mountains on dry, rocky ridges and slopes near upper treeline above the matrix spruce-fir forest. It extends down to the lower montane in the central and northern Rocky Mountains, particularly along the Front Range north into Canada. Sites are harsh, exposed to desiccating winds with rocky substrates and a short growing season that limit plant growth. Higher elevation occurrences are found well into the subalpine - alpine transition on wind-blasted, mostly west-facing slopes and exposed ridges. Calcareous substrates are important for *Pinus flexilis*-dominated communities in the northern Rocky Mountains and possibly elsewhere. The open tree canopy is often patchy and is strongly dominated by *Pinus flexilis* or *Pinus aristata* with the latter restricted to southern Colorado and northern New Mexico. In the northern Rockies, *Pinus albicaulis* is found in some occurrences. Other trees such as *Juniperus* spp., *Pinus contorta, Pinus ponderosa*, or *Pseudotsuga menziesii* are occasionally present. *Arctostaphylos uva-ursi, Cercocarpus ledifolius, Juniperus communis, Mahonia repens, Purshia tridentata, Ribes montigenum*, or *Vaccinium* spp. may form an open shrub layer in some stands. The herbaceous layer, if present, is generally sparse and composed of xeric



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graminoids, such as *Calamagrostis purpurascens, Festuca arizonica, Festuca idahoensis, Festuca thurberi*, or *Pseudoroegneria spicata*, or more alpine plants.

**Comments:** This system is distinguished from lower montane and foothill limber pine stands in Wyoming and Montana. This foothill system is found at the lower treeline, below the zone of continuous *Pinus ponderosa* or *Pseudotsuga menziesii* woodlands and forest, and extends out into the eastern portions of these states in the foothill zones of mountain ranges, along rock outcrops, breaks along rivers, and on sheltered sites where soil moisture is slightly higher than surrounding grasslands.

### DISTRIBUTION

**Range:** Occurs throughout the Rocky Mountains on dry, rocky ridges and slopes near upper treeline.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- PINUS ALBICAULIS FOREST ALLIANCE (A.132)
  Pinus albicaulis / Vaccinium scoparium Forest (CEGL000131)
- PINUS ALBICAULIS WOODLAND ALLIANCE (A.531)
  Pinus albicaulis / Calamagrostis rubescens Woodland (CEGL000753)
  Pinus albicaulis / Juniperus communis Woodland (CEGL000756)
- PINUS ARISTATA WOODLAND ALLIANCE (A.537)
  Pinus aristata / Festuca arizonica Woodland (CEGL000759)
  Pinus aristata / Festuca thurberi Woodland (CEGL000760)
  Pinus aristata / Juniperus communis Woodland (CEGL002894)
  Pinus aristata / Ribes montigenum Woodland (CEGL000761)
  Pinus aristata / Trifolium dasyphyllum Woodland (CEGL000762)
  Pinus aristata / Vaccinium myrtillus Woodland (CEGL002895)
- PINUS FLEXILIS TEMPORARILY FLOODED WOODLAND ALLIANCE (A.564)
  Pinus flexilis / Dasiphora fruticosa ssp. floribunda / Distichlis spicata Woodland (CEGL000812)
- PINUS FLEXILIS WOODLAND ALLIANCE (A.540)
  Pinus flexilis / Arctostaphylos uva-ursi Woodland (CEGL000802)
  Pinus flexilis / Calamagrostis purpurascens Woodland (CEGL000803)
  Pinus flexilis / Cercocarpus ledifolius Woodland (CEGL000804)
  Pinus flexilis / Festuca campestris Woodland (CEGL000806)
  Pinus flexilis / Festuca idahoensis Woodland (CEGL000805)
  Pinus flexilis / Juniperus communis Woodland (CEGL000807)
  Pinus flexilis / Juniperus osteosperma Woodland (CEGL000808)
  Pinus flexilis / Juniperus scopulorum Woodland (CEGL000809)
  Pinus flexilis / Leucopoa kingii Woodland (CEGL000810)
  Pinus flexilis / Mahonia repens Woodland (CEGL000811)
  Pinus flexilis / Pseudoroegneria spicata Woodland (CEGL000813)
- PSEUDOTSUGA MENZIESII WOODLAND ALLIANCE (A.552)
  Pseudotsuga menziesii - Pinus flexilis / Leucopoa kingii Woodland (CEGL000906)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.832 ROCKY MOUNTAIN SUBALPINE-MONTANE RIPARIAN SHRUBLAND

Division 306,

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**Spatial Scale & Pattern:** Linear **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland
**Concept Summary:** This system is found throughout the Rocky Mountain cordillera from New Mexico north into Montana, and also occurs in mountainous areas of the Intermountain region and Colorado Plateau. These are montane to subalpine riparian shrublands occurring as narrow bands of shrubs lining streambanks and alluvial terraces in narrow to wide, low-gradient valley bottoms and floodplains with sinuous stream channels. Generally it is found at higher elevations, but can be found anywhere from 1700-3475 m. Occurrences can also be found around seeps, fens, and isolated springs on hillslopes away from valley bottoms. Many of the plant associations found within this system are associated with beaver activity. This system often occurs as a mosaic of multiple communities that are shrub- and herb-dominated and includes above-treeline, willow-dominated, snowmelt-fed basins that feed into streams. The dominant shrubs reflect the large elevational gradient and include *Alnus incana, Betula nana, Betula occidentalis, Cornus sericea, Salix bebbiana, Salix boothii, Salix brachycarpa, Salix drummondiana, Salix eriocephala, Salix geyeriana, Salix monticola, Salix planifolia*, and *Salix wolfii*. Generally the upland vegetation surrounding these riparian systems are of either conifer or aspen forests.



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## DISTRIBUTION

**Range:** Found throughout the Rocky Mountain cordillera from New Mexico north into Montana, and also occurs in mountainous areas of the Intermountain region and Colorado Plateau.

**Ecological Divisions:**

## CONCEPT

**Alliances and Associations:**

- ACER GLABRUM TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.952)
  Acer glabrum Drainage Bottom Shrubland (CEGL001062)
- ALNUS INCANA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.986)
  Alnus incana - Salix (monticola, lucida, ligulifolia) Shrubland (CEGL002651)
  Alnus incana / Athyrium filix-femina Shrubland (CEGL002628)
  Alnus incana / Carex scopulorum var. prionophylla Shrubland (CEGL000122)
  Alnus incana / Equisetum arvense Shrubland (CEGL001146)
  Alnus incana / Glyceria striata Shrubland (CEGL000228)
  Alnus incana / Lysichiton americanus Shrubland (CEGL002629)
  Alnus incana / Scirpus microcarpus Shrubland (CEGL000481)
  Alnus incana / Spiraea douglasii Shrubland (CEGL001152)
- ALNUS INCANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.950)
  Alnus incana - Betula occidentalis Shrubland (CEGL001142)
  Alnus incana - Salix drummondiana Shrubland (CEGL002652)
  Alnus incana / Calamagrostis canadensis Shrubland (CEGL001143)
  Alnus incana / Carex (aquatilis, deweyana, lenticularis, luzulina, pellita) Shrubland (CEGL001144)
  Alnus incana / Cornus sericea Shrubland (CEGL001145)
  Alnus incana / Mesic Forbs Shrubland (CEGL001147)
  Alnus incana / Mesic Graminoids Shrubland (CEGL001148)
  Alnus incana / Ribes (inerme, hudsonianum, lacustre) Shrubland (CEGL001151)
  Alnus incana / Symphoricarpos albus Shrubland (CEGL001153)
  Alnus incana Shrubland (CEGL001141)
  Alnus incana ssp. tenuifolia - Salix irrorata Shrubland (CEGL002687)
- ALNUS OBLONGIFOLIA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.953)
  Alnus oblongifolia / Symphoricarpos oreophilus Shrubland (CEGL001063)
- ALNUS VIRIDIS SSP. SINUATA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.966)
  Alnus viridis ssp. sinuata / Athyrium filix-femina - Cinna latifolia Shrubland (CEGL001156)
  Alnus viridis ssp. sinuata Shrubland [Placeholder] (CEGL001154)
- BETULA NANA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.995)
  Betula nana / Mesic Forbs - Mesic Graminoids Shrubland (CEGL002653)
- BETULA OCCIDENTALIS SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.996)
  Betula occidentalis - Dasiphora fruticosa ssp. floribunda Shrubland (CEGL001083)
  Betula occidentalis / Mesic Graminoids Shrubland (CEGL002654)
  Betula occidentalis Shrubland (CEGL001080)
- BETULA OCCIDENTALIS TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.967)
  Betula occidentalis / Cornus sericea Shrubland (CEGL001161)
  Betula occidentalis / Maianthemum stellatum Shrubland (CEGL001162)
- CORNUS SERICEA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.968)
  Cornus sericea / Galium triflorum Shrubland (CEGL001166)
  Cornus sericea / Heracleum maximum Shrubland (CEGL001167)
  Cornus sericea Shrubland (CEGL001165)
- CORYLUS CORNUTA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.2596)
  Corylus cornuta Shrubland [Provisional] (CEGL002903)
- DASIPHORA FRUTICOSA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.958)
  Dasiphora fruticosa ssp. floribunda / Deschampsia caespitosa Shrubland (CEGL001107)
- FRAXINUS ANOMALA TEMPORARILY FLOODED WOODLAND ALLIANCE (A.2511)
  Fraxinus anomala Woodland (CEGL002752)
- RIBES LACUSTRE TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.970)
  Ribes lacustre - Ribes hudsonianum / Cinna latifolia Shrubland (CEGL003445)
  Ribes lacustre - Ribes hudsonianum / Glyceria striata Shrubland (CEGL003446)
  Ribes lacustre / Mertensia ciliata Shrubland (CEGL001172)
- SALIX BEBBIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.971)
  Salix bebbiana / Mesic Graminoids Shrubland (CEGL001174)
  Salix bebbiana Shrubland (CEGL001173)
- SALIX BOOTHII SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.1001)
  Salix (boothii, geyeriana) / Carex aquatilis Shrubland (CEGL001176)
  Salix boothii / Calamagrostis canadensis Shrubland (CEGL001175)

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Salix boothii / Carex nebrascensis Shrubland (CEGL001177)
Salix boothii / Equisetum arvense Shrubland (CEGL002671)

- SALIX BOOTHII TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.972)
  Salix boothii - Salix eastwoodiae / Carex nigricans Shrubland (CEGL002607)
  Salix boothii - Salix geyeriana / Carex angustata Shrubland (CEGL001185)
  Salix boothii - Salix geyeriana Shrubland (CEGL001184)
  Salix boothii - Salix lemmonii Shrubland (CEGL001186)
  Salix boothii / Carex utriculata Shrubland (CEGL001178)
  Salix boothii / Deschampsia caespitosa - Geum rossii Shrubland (CEGL002904)
  Salix boothii / Maianthemum stellatum Shrubland (CEGL001187)
  Salix boothii / Mesic Forbs Shrubland (CEGL001180)
  Salix boothii / Mesic Graminoids Shrubland (CEGL001181)
  Salix boothii / Poa palustris Shrubland (CEGL001183)
- SALIX BRACHYCARPA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.998)
  Salix brachycarpa / Carex aquatilis Shrubland (CEGL001244)
  Salix brachycarpa / Mesic Forbs Shrubland (CEGL001135)
- SALIX CANDIDA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.1002)
  Salix candida / Carex utriculata Shrubland (CEGL001188)
- SALIX COMMUTATA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.1003)
  Salix commutata / Carex scopulorum Shrubland (CEGL001189)
- SALIX DRUMMONDIANA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.1004)
  Salix drummondiana / Carex scopulorum var. prionophylla Shrubland (CEGL001584)
  Salix drummondiana / Carex utriculata Shrubland (CEGL002631)
- SALIX DRUMMONDIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.973)
  Salix drummondiana / Calamagrostis canadensis Shrubland (CEGL002667)
  Salix drummondiana / Mesic Forbs Shrubland (CEGL001192)
  Salix drummondiana Shrubland [Placeholder] (CEGL001190)
- SALIX ERIOCEPHALA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.974)
  Salix eriocephala / Ribes aureum - Rosa woodsii Shrubland (CEGL001233)
- SALIX GEYERIANA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.1006)
  Salix geyeriana / Calamagrostis canadensis Shrubland (CEGL001205)
  Salix geyeriana / Carex aquatilis Shrubland (CEGL001206)
  Salix geyeriana / Carex utriculata Shrubland (CEGL001207)
- SALIX GEYERIANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.975)
  Salix geyeriana - Salix eriocephala Shrubland (CEGL001213)
  Salix geyeriana - Salix lemmonii / Carex aquatilis var. dives Shrubland (CEGL001212)
  Salix geyeriana - Salix monticola / Calamagrostis canadensis Shrubland (CEGL001247)
  Salix geyeriana - Salix monticola / Mesic Forbs Shrubland (CEGL001223)
  Salix geyeriana / Deschampsia caespitosa Shrubland (CEGL001208)
  Salix geyeriana / Mesic Forbs Shrubland (CEGL002666)
  Salix geyeriana / Mesic Graminoids Shrubland (CEGL001210)
  Salix geyeriana / Poa palustris Shrubland (CEGL001211)
- SALIX GLAUCA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.963)
  Salix glauca / Deschampsia caespitosa Shrubland (CEGL001137)
- SALIX LEMMONII SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.2523)
  Salix lemmonii / Mesic-Tall Forbs Shrubland (CEGL002771)
  Salix lemmonii / Rosa woodsii Shrubland (CEGL002772)
- SALIX LIGULIFOLIA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.978)
  Salix ligulifolia / Carex utriculata Shrubland [Provisional] (CEGL002975)
  Salix ligulifolia Shrubland (CEGL001218)
- SALIX LUCIDA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.979)
  Salix lucida ssp. caudata / Rosa woodsii Shrubland (CEGL002621)
  Salix lucida ssp. caudata Shrubland [Provisional] (CEGL001215)
- SALIX LUTEA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.1007)
  Salix lutea / Carex utriculata Shrubland (CEGL001220)
- SALIX LUTEA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.980)
  Salix lutea / Calamagrostis canadensis Shrubland (CEGL001219)
  Salix lutea / Mesic Forbs Shrubland (CEGL002774)
  Salix lutea / Rosa woodsii Shrubland (CEGL002624)
- SALIX MONTICOLA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.981)
  Salix monticola / Angelica ampla Shrubland (CEGL001221)
  Salix monticola / Calamagrostis canadensis Shrubland (CEGL001222)
  Salix monticola / Carex aquatilis Shrubland (CEGL002656)
  Salix monticola / Carex utriculata Shrubland (CEGL002657)
  Salix monticola / Mesic Forbs Shrubland (CEGL002658)

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Salix monticola / Mesic Graminoids Shrubland (CEGL002659)
Salix monticola Thicket Shrubland (CEGL001139)

- SALIX PLANIFOLIA SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.1008)
  Salix planifolia / Caltha leptosepala Shrubland (CEGL002665)
  Salix planifolia / Carex aquatilis Shrubland (CEGL001227)
  Salix planifolia / Carex scopulorum Shrubland (CEGL001229)
  Salix planifolia / Mesic Forbs Shrubland [Provisional] (CEGL002893)
  Salix planifolia Shrubland (CEGL001224)
- SALIX PLANIFOLIA TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.982)
  Salix planifolia / Calamagrostis canadensis Shrubland (CEGL001225)
  Salix planifolia / Deschampsia caespitosa Shrubland (CEGL001230)
- SALIX WOLFII SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.1009)
  Salix wolfii / Carex aquatilis Shrubland (CEGL001234)
  Salix wolfii / Carex microptera Shrubland (CEGL001235)
  Salix wolfii / Carex nebrascensis Shrubland (CEGL001236)
  Salix wolfii / Carex utriculata Shrubland (CEGL001237)
  Salix wolfii / Swertia perennis - Pedicularis groenlandica Shrubland (CEGL001242)
- SALIX WOLFII TEMPORARILY FLOODED SHRUBLAND ALLIANCE (A.983)
  Salix wolfii / Deschampsia caespitosa Shrubland (CEGL001238)
  Salix wolfii / Fragaria virginiana Shrubland (CEGL001239)
  Salix wolfii / Mesic Forbs Shrubland (CEGL001240)
  Salix wolfii / Poa palustris Shrubland (CEGL001241)

### SOURCES

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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## CES306.833 ROCKY MOUNTAIN SUBALPINE-MONTANE RIPARIAN WOODLAND

Division 306,

**Spatial Scale & Pattern:** Linear **Classification Confidence:** medium
**Required Classifiers:** Natural/Semi-natural, Vegetated (>10% vasc.), Wetland
**Concept Summary:** This riparian woodland system is comprised of seasonally flooded forests and woodlands found at montane to subalpine elevations of the Rocky Mountain cordillera, from southern New Mexico north into Montana, and west into the Intermountain region and the Colorado Plateau. This system contains the conifer and aspen woodlands that line montane streams. These are communities tolerant of periodic flooding and high water tables. Snowmelt moisture in this system may create shallow water tables or seeps for a portion of the growing season. Stands typically occur at elevations between 1500-3300 m (4920-10,830 feet) and are confined to specific riparian environments occurring on floodplains or terraces of rivers and streams, in V-shaped, narrow valleys and canyons (where there is cold-air drainage). Less frequently, occurrences are found in moderate-wide valley bottoms on large floodplains along broad, meandering rivers, and on pond or lake margins. Dominant tree species include *Abies lasiocarpa, Picea engelmannii, Pseudotsuga menziesii, Picea pungens, Populus tremuloides*, and *Juniperus scopulorum*. Other trees that may be present include *Alnus incana, Abies concolor, Pinus contorta, Populus angustifolia, Acer negundo*, and *Juniperus osteosperma*.

### DISTRIBUTION

**Range:** Found at montane to subalpine elevations of the Rocky Mountain cordillera, from southern New Mexico north into Montana, and west into the Intermountain region and the Colorado Plateau.
**Ecological Divisions:**

### CONCEPT

**Alliances and Associations:**

- ABIES CONCOLOR FOREST ALLIANCE (A.152)
  Abies concolor - Picea pungens - Populus angustifolia / Acer glabrum Forest (CEGL000255)
- ABIES LASIOCARPA SEASONALLY FLOODED FOREST ALLIANCE (A.190)
  Abies lasiocarpa / Alnus incana Forest (CEGL000296)
  Abies lasiocarpa / Carex aquatilis Forest (CEGL002636)
  Abies lasiocarpa / Ledum glandulosum Forest (CEGL000314)
  Abies lasiocarpa / Oplopanax horridus Forest (CEGL000322)
  Abies lasiocarpa / Salix drummondiana Forest (CEGL000327)
- ABIES LASIOCARPA TEMPORARILY FLOODED FOREST ALLIANCE (A.177)
  Abies lasiocarpa / Alnus viridis ssp. sinuata Forest (CEGL000297)
  Abies lasiocarpa / Mertensia ciliata Forest (CEGL002663)



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Abies lasiocarpa / Streptopus amplexifolius Forest (CEGL000336)
Abies lasiocarpa / Trautvetteria caroliniensis Forest (CEGL000339)

- PICEA ENGELMANNII SEASONALLY FLOODED FOREST ALLIANCE (A.191)
  Picea (engelmannii X glauca, engelmannii) / Carex disperma Forest (CEGL000405)
  Picea engelmannii / Caltha leptosepala Forest (CEGL000357)
  Picea engelmannii / Carex angustata Forest (CEGL000359)
  Picea engelmannii / Carex disperma Forest (CEGL000358)
- PICEA ENGELMANNII SEASONALLY FLOODED WOODLAND ALLIANCE (A.572)
  Picea engelmannii / Carex scopulorum var. prionophylla Woodland (CEGL002630)
  Picea engelmannii / Eleocharis quinqueflora Woodland (CEGL000361)
- PICEA ENGELMANNII TEMPORARILY FLOODED FOREST ALLIANCE (A.179)
  Picea engelmannii / Heracleum maximum Forest (CEGL000367)
- PICEA ENGELMANNII TEMPORARILY FLOODED WOODLAND ALLIANCE (A.566)
  Picea engelmannii / Cornus sericea Woodland (CEGL002677)
- PICEA GLAUCA TEMPORARILY FLOODED FOREST ALLIANCE (A.172)
  Picea glauca Alluvial Black Hills Forest (CEGL002057)
- PICEA PUNGENS TEMPORARILY FLOODED WOODLAND ALLIANCE (A.567)
  Picea pungens / Alnus incana Woodland (CEGL000894)
  Picea pungens / Betula occidentalis Woodland (CEGL002637)
  Picea pungens / Cornus sericea Woodland (CEGL000388)
  Picea pungens / Dasiphora fruticosa ssp. floribunda Woodland (CEGL000396)
  Picea pungens / Equisetum arvense Woodland (CEGL000389)
  Picea pungens / Rosa woodsii Woodland (CEGL000398)
- PINUS CONTORTA SEASONALLY FLOODED FOREST ALLIANCE (A.188)
  Pinus contorta / Calamagrostis canadensis Forest (CEGL000138)
- PINUS CONTORTA TEMPORARILY FLOODED FOREST ALLIANCE (A.175)
  Pinus contorta / Deschampsia caespitosa Forest (CEGL000147)
- PINUS CONTORTA TEMPORARILY FLOODED WOODLAND ALLIANCE (A.562)
  Pinus contorta / Carex (aquatilis, angustata) Woodland (CEGL000140)
- POPULUS TREMULOIDES FOREST ALLIANCE (A.274)
  Populus tremuloides / Corylus cornuta Forest (CEGL000583)
- POPULUS TREMULOIDES SEASONALLY FLOODED FOREST ALLIANCE (A.340)
  Populus tremuloides / Calamagrostis canadensis Forest (CEGL000574)
  Populus tremuloides / Carex aquatilis var. aquatilis Forest (CEGL003442)
  Populus tremuloides / Carex obnupta Forest (CEGL003371)
  Populus tremuloides / Equisetum arvense Forest (CEGL000584)
  Populus tremuloides / Ranunculus alismifolius Forest (CEGL000599)
- POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE (A.300)
  Populus tremuloides / Alnus incana - Salix spp. Forest (CEGL001082)
  Populus tremuloides / Alnus incana / Betula nana - Ribes spp. Forest (CEGL001149)
  Populus tremuloides / Alnus incana Forest (CEGL001150)
  Populus tremuloides / Betula occidentalis Forest (CEGL002650)
  Populus tremuloides / Carex pellita Forest (CEGL000577)
  Populus tremuloides / Cornus sericea Forest (CEGL000582)
  Populus tremuloides / Quercus gambelii / Symphoricarpos oreophilus Forest (CEGL000598)
  Populus tremuloides / Ribes montigenum Forest (CEGL000600)
  Populus tremuloides / Salix drummondiana Forest (CEGL002902)
  Populus tremuloides / Senecio bigelovii var. bigelovii Forest (CEGL000590)
  Populus tremuloides / Veratrum californicum Forest (CEGL000621)
  Populus tremuloides Canyon Formation Forest (CEGL000576)

**SOURCES**

**Last updated:** 20 Feb 2003 **Stakeholders:**
**Concept Author:** NatureServe Western Ecology Team **LeadResp:** WCS

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