10740

Chihuahuan Creosotebush Desert Scrub

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Shrubland

Map Zones

25, 26

Geographic Range

Southern New Mexico, Northern Mexico, west Texas, throughout Chihuahuan Desert.

Biophysical Site Description

This ecological system is the common lower elevation desert scrub that occurs throughout much of the Chihuahuan Desert and has recently expanded into former desert grasslands in the northern portion of its range. Stands typically occur in flat to gently sloping desert basins and on alluvial plains, extending up into lower to mid positions of piedmont slopes (bajada). Substrates range from coarse textured loams on gravelly plains to finer textured silty and clayey soils in basins. Soils are alluvial, typically loamy and non-saline, and frequently calcareous as they are often derived from limestone and, to a lesser degree, igneous rocks.

Vegetation Description

The vegetation is characterized by a moderate to sparse shrub layer (<10% cover on extremely xeric sites) that is typically strongly dominated by *Larrea tridentata* with *Flourensia cernua* often present to co-dominant. A few scattered shrubs or succulents may also be present, such as *Agave lechuguilla*, *Parthenium incanum*, *Jatropha dioica*, *Koeberlinia spinosa*, *Lycium* spp., and *Yucca* spp. Additionally, *Flourensia cernua* will often strongly dominate in silty basins that are included in this ecological system. In general, shrub diversity is low as this ecological system lacks co-dominant thornscrub and other mixed desert scrub species that are common on the gravelly mid to upper piedmont slopes. However, shrub diversity and cover may increase locally where soils are deeper and along minor drainages with occasional *Atriplex canescens*, *Gutierrezia sarothrae*, or *Prosopis glandulosa*. Herbaceous cover is usually low and composed of grasses. Common species may include *Bouteloua eriopoda*, *Dasyochloa pulchella,* *Erioneuron pulchellum*, *Muhlenbergia porteri*, *Pleuraphis mutica*, *Scleropogon brevifolius*, and *Sporobolus airoides*. Included in this ecological system are shrublands with a sparse understory of *Larrea tridentata* that occur on gravelly to silty, upper basin floors and alluvial plains.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| LATR2 | *Larrea tridentata* | Creosote bush |
| FLCE | *Flourensia cernua* | American tarwort |
| AGLE | *Agave lechuguilla* | Lechuguilla |
| PAIN2 | *Parthenium incanum* | Mariola |
| JADI | *Jatropha dioica* | Leatherstem |
| KOSP | *Koeberlinia spinosa* | Crown of thorns |
| BOER4 | *Bouteloua eriopoda* | Black grama |
| DAPU7 | *Dasyochloa pulchella* | Low woollygrass |

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

Most desert fires are infrequent and of low severity. Drought may be a more significant factor than fire in this model. Standing biomass, deadwood, and leaf litter can fuel desert fires following rainy seasons. Historic fire regimes on gravelly soils with mixed grassland/desert shrub are difficult to quantify, but fires were historically rare except under unusual circumstances.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement |  |  |  |  |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires |  |  |  |  |

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

1,000-500,000ac

Adjacency or Identification Concerns

In the Unted States, much of this scrubland is thought to be a result of recent expansion of *Larrea tridentata* into former desert grasslands over the last 150yrs as a result of drought, overgrazing by livestock, and/or decreases in fire over the last 70-250yrs (Buffington and Herbel 1965; Ahlstrand 1979; Donart 1984; Dick-Peddie 1993; Gibbens et al. 2005). This system includes vast areas of loamy plains that have been converted from *Pleuraphis mutica* and *Bouteloua eriopoda* desert grasslands to *Larrea tridentata* scrub. This system also includes invasive *Flourensia cernua* shrublands that occur in former (degraded) tobosa (*Pleuraphis mutica*) flats and loamy plains. Presence of *Scleropogon brevifolius* is common in these invasive stands. Dick-Peddie (1993) suggested that absence of *Flourensia cernua* as co-dominant and presence of *Dasyochloa pulchella*, *Acourtia nana,* *Perezia nana*, and *Yucca elata* may be indicators of recent conversion of desert grasslands into desert scrub, but more research is needed. Conversely, shrublands with a sparse understory of *Larrea tridentata* on remnant early Holocene erosional surfaces, often with desert pavement, may indicate historic distributions of *Larrea tridentata* desert scrub in the Chihuahuan Desert (Muldavin et al. 2000).

Issues or Problems

Fire ecology studies at the population level are badly needed for black grama. Historic fire regimes in this Biophysical Setting (BpS) are difficult to quantify. Fire was not considered a disturbance in this model and was not used in VDDT.

Native Uncharacteristic Conditions

Historically, creosote-dominated stands would not occur in this BpS. That condition is included in another BpS (Chihuahuan Mixed Desert Shrubland BpS 11005), which contains inclusions of Appacherian-Chihuahuan Mesquite Upland Scrub (1095).

Comments

For map zone (MZ) 26, this model was adopted from MZ25 without changes. Lee Elliott reviewed the model for MZ26.

For MZ25, this model was first developed in Las Cruces workshop by Jony Cockman, Don Ellsworth, David Anderson (White Sands Missile Range), Steven Yanoff, and Brandon Bestlemyer (ARS, Jornada). Following the Las Cruces workshop, efforts by NatureServe and others resulted in changes and clarifications to the BpS concept, and new information was incorporated into this document by Mike Babler. The original MZ25 modelers' names were removed from this revised version due to lack of time for their review of changes.

Succession Classes

**Mapping Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Upper Layer Lifeform** | **Height (m)** | **Canopy Cover (%)** | | | | | | | | | |
| **0-10** | **11-20** | **21-30** | **31-40** | **41 - 50** | **51-60** | **61-70** | **71-80** | **81-90** | **91-100** |
| Herb | 0-0.5 | A | A | A | A | A | A | A | A | A | A |
| Herb | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Herb | >1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0-0.5 | A | A | B | B | B | B | B | B | B | B |
| Shrub | 0.5-1.0 | A | A | B | B | B | B | B | B | B | B |
| Shrub | 1.0-3.0 | A | A | B | B | B | B | B | B | B | B |
| Shrub | >3.0 | A | A | B | B | B | B | B | B | B | B |
| Tree | 0-5 | B | B | B | B | B | UN | UN | UN | UN | UN |
| Tree | 5-10 | B | B | B | B | B | UN | UN | UN | UN | UN |
| Tree | 10-25 | B | B | B | B | B | UN | UN | UN | UN | UN |
| Tree | 25-50 | B | B | B | B | B | UN | UN | UN | UN | UN |
| Tree | >50 | B | B | B | B | B | UN | UN | UN | UN | UN |

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

**Description**

Class A 17 Early Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| LATR2 | Larrea tridentata | Creosote bush | Upper |
| FLCE | Flourensia cernua | American tarwort | Upper |

Description

Under natural conditions, shrub cover generally represents <10% canopy cover and is likely not affected by disturbance. The grass community may be as low as 10% canopy cover after a combination of drought/fire. Little disturbance was considered in Class A, modeled drought maintaining the age (Option 2). In the historic condition where invasive annual grasses are absent, the fire return interval is virtually nonexistent except for areas near the base of mountains experiencing locally higher rainfall and fine fuel buildup. Class A transitions to B. However, if the upper soil horizon and/or microbes are lost, then a longer recovery time is required. Or complete recovery is not possible.

Shrubs likely sparse and not detectable by satellite image. Herb cover is also low so is difficult to map due to satellite imagery limitations. There should be a layer of biocrust involved in this and later succession classes. This crust is important for nutrient cycling and for stabilizing the soil surface from erosion.

*Maximum Tree Size Class*  
None

Class B 83 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| LATR2 | Larrea tridentata | Creosote bush | Upper |
| FLCE | Flourensia cernua | American tarwort | Upper |
| AGLE | Agave lechuguilla | Lechuguilla | Upper |
| KOSP | Koeberlinia spinosa | Crown of thorns | Upper |

Description

Cover is relatively low even at later ages. Replacement fire followed by prolonged drought (Option 1). Wind/weather stress also affected this community but did not cause a transition to Class A. Class B is likely overrepresented on the landscape today. There should be a layer of biocrust involved in this and later succession classes. This crust is important for nutrient cycling and for stabilizing the soil surface from erosion.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Late1:OPN | 99 |
| Late1:OPN | 100 | Late1:OPN | 999 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |
| Optional 2 | Early1:OPN | Early1:OPN | 0.02 | 50 | No | 0 |
| Optional 1 | Late1:OPN | Early1:OPN | 0.002 | 500 | Yes | 0 |
| Wind or Weather or Stress | Late1:OPN | Late1:OPN | 0.0125 | 80 | No | 0 |

Optional Disturbances

Optional 1: Replacement fire followed by severe drought

Optional 2: Drought

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