11002

Chihuahuan Mixed Desert and Thorn Scrub - Shrubland

BpS Model/Description Version: Aug. 2020

**Reviewer:** Tim Christiansen, [timothy.a.christiansen.nfg@mail.mil](mailto:timothy.a.christiansen.nfg@mail.mil)

Vegetation Type

Shrubland

Map Zone

25

Model Splits or Lumps

This Biophysical Setting (BpS) is split into multiple models (see Comments section).

Geographic Range

Historically this BpS is thought to be a minor desert scrub that occurs on gravelly mid to upper bajadas, foothills, and dissected gravelly alluvial fans in the Chihuahuan Desert and has recently expanded into former desert grasslands and steppe in the northern portion of its range and become a major existing vegetation type.

Biophysical Site Description

This BpS is thought to be a minor desert scrub that occurs on gravelly mid to upper bajadas, foothills, and dissected gravelly alluvial fans in the Chihuahuan Desert and has recently expanded into former desert grasslands in the northern portion of its range. It generally occurs on mid to upper piedmonts above the desert plains Chihuahuan Creosotebush Desert Scrub (CES302.731) and extends up to the chaparral zone. Soils are typically well-drained, non-saline, gravelly loams, often with a petrocalic layer. Substrates are frequently derived from limestone, although igneous rocks are common in some areas (Brown 1982; MacMahon and Wagner 1985; Henrickson and Johnston 1986; MacMahon 1988; Dick Peddie 1993).

Vegetation Description

This mid to upper piedmont ecological system is characterized by the presence of *Larrea tridentata* typically mixed with thornscrub or other desert scrub such as *Agave lechuguilla*, *Aloysia wrightii*, *Baccharis pteronioides*, *Dasylirion leiophyllum*, *Flourensia cernua* (not bottomland), *Fouquieria splendens*, *Koeberlinia spinosa*, *Krameria erecta*, *Leucophyllum minus*, *Mimosa aculeaticarpa* var. *biuncifera*, *Mortonia scabrella* (= *Mortonia sempervirens* ssp. *scabrella*), *Opuntia engelmannii*, *Parthenium incanum*, *Prosopis glandulosa*, and *Rhus microphylla* (in drainages). Stands of thornbrush dominated by *Acacia constricta*, *Acacia neovernicosa*, or *Acacia greggii* are included in this system, and limestone substrates appear important for at least these species. If present, *Prosopis glandulosa* has lower cover than other shrubs and does not dominate the shrub layer. This system also includes upper piedmont stands of desert scrub that are strongly dominated by *Larrea tridentata*. Grasses are common but generally have lower cover than shrubs. Common species may include *Bouteloua curtipendula*, *Bouteloua eriopoda*, *Bouteloua gracilis*, *Bouteloua hirsuta*, *Bouteloua ramosa*, *Dasyochloa pulchella*, and *Muhlenbergia porteri*. Also included in this ecological system are shrublands with a sparse understory of *Larrea tridentata* that occur on gravelly piedmont slopes that may extend down gravelly upper basins. A pebbly desert pavement may be present on the soil surface. This may indicate remnant erosional surfaces from the early Holocene that are thought to be some of the historic distribution of *Larrea tridentata* desert scrub in the Chihuahuan Desert (Muldavin et al. 2000b). Historically, much of this desert scrub was thought to be Chihuahuan Grama Grass Steppe (2511003) characterized by perennial desert grasses such as *Bouteloua eriopoda*, *Bouteloua ramosa*, *Muhlenbergia porteri*, *Bothriochloa barbinodis*, or *Digitaria californica* with an open creosotebush mixed desert shrub layer.

BpS Dominant and Indicator Species

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 Results

Scale Description

1,000-500,000ac

Adjacency or Identification Concerns

Another BpS occurs in this area -- Chihuahuan Mixed Desert and Thorn Scrub - Steppe (BpS 11003) -- and is environmentally very similar to this BpS.

This BpS occurs on gravelly substrates typically above BpS 1074 Chihuahuan Creosotebush Desert Scrub (CES302.731), which is characteristic of alluvial plains and broad desert basins.

Issues or Problems

Fire ecology studies at the population level are badly needed for black grama. Historic fire regimes in this BpS are difficult to quantify.

Native Uncharacteristic Conditions

In the United States, much of this scrubland is thought to be a result of recent expansion of *Larrea tridentata* into former desert grasslands and steppe 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). Dick Peddie (1993) suggested that absence of *Flourensia cernua* as a co-dominant and presence of *Dasyochloa pulchella*, *Acourtia nana*, and *Yucca elata* may be indicators of recent conversion of desert grasslands into desert scrub, but more research is needed. Conversely, sparse understory *Larrea tridentata* shrublands on remnant early Holocene erosional surfaces, often with shallow calcareous soils and desert pavement, may indicate historic distributions of *Larrea tridentata* desert scrub in the Chihuahuan Desert (Stein and Ludwig 1979; Muldavin et al. 2000b). In the northern Chihuahuan Desert, this creosotebush mixed desert and thornscrub shrubland ecological system is thought to occur in pre-settlement conditions largely as mixed desert shrub steppe on upper bajada gravelly soils and dissected gravelly alluvial fans (S. Yanoff personal communication 2006). This grama grass steppe with an open canopy of desert scrub species is a mostly historical grama grass steppe BpS that was described during LANDFIRE map zone (MZ) 25 BpS modeling workshops as Chihuahuan Mixed Desert and Thorn Scrub – Steppe (prior to LANDFIRE Remap this BpS was named Chihuahuan Grama Grass Creosote Steppe). It is distinct from creosotebush mixed shrublands on similar sites because it has an open shrub layer characterized by dense perennial grasses (typically black grama).

Comments

Prior to LANDFIRE Remap this BpS named Chihuahuan Mixed Desert Shrubland.

Note that 251100 was split in MZ25 into 11002 and 11003. Model 2511002 was drafted based on 2511003 developed at the Jornada workshop (David Anderson, White Sands Missile Range; Brandon Bestlemyer, ARS, Jornada). Mike Babler adjusted the percentages in classes to better reflect VDDT results based on disturbance probabilities specified in the class descriptions.

During LANDFIRE BpS modeling, we identified the recent, invasive creosotebush scrub on state Loamy Plains (not reference condition). Now we have: 1) CES302.731 Chihuahuan Creosotebush Desert Scrub (2510740), which represents all the desert alluvial flats and plains desert scrub (into lower bajada), both gravelly and loamy (recent invasion/former desert grasslands), that is mostly pure creosotebush and/or tarbush. There are probably small patch inclusions of rocky outcrops/breaks and isolated ballenas with mixed desert scrub (definitely with CES302.738 Chihuahuan Succulent Desert Scrub). 2) CES302.734 Chihuahuan Mixed Desert and Thorn Scrub - Shrubland (11002), which includes mixed desert and thornscrub that is common on more gravelly, rocky, dissected, mid to upper piedmont/bajada, plus the pure creosotebush and creosotebush/tarbush scrub that also occurs there on those landforms. This is a minor type historically, and Chihuahuan Mixed Desert and Thorn Scrub - Steppe (2511003) was thought to have dominated the mid to upper piedmont slopes.

It is messy floristically because strongly dominated "pure" creosotebush scrub occurs in both environments, and they transition into one another.

Succession Classes

**Mapping Rules**

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 26 Early Development 1 - Open

Indicator Species

Description

Shrubs may be sparse and are difficult to map due to satellite imagery limitation. Under natural conditions, shrub cover is likely not affected by disturbance. The grass community may be low as well after a combination of drought/fire. Little disturbance was considered in Class A; modeled drought can reset the stage (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. If the upper soil horizon and/or microbes are lost, then a longer recovery time is required. Or complete recovery is not possible.

*Maximum Tree Size Class*  
None

Class B 74 Late Development 1 - Open

Indicator Species

Description

Higher cover of shrubs and grasses and associated with more productive soils. Shrubs characteristically dominate the upper layer. Replacement fire followed by prolonged drought (Option 1). Wind/weather stress also affected this community but did not create a transition.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

Probabilistic Transitions

Optional Disturbances

Optional 1: Replacement fire followed by severe drought

Optional 2: Drought

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