10870

Sonora-Mojave Creosotebush-White Bursage Desert Scrub

BpS Model/Description Version: Aug. 2020

Revise Date: 9/17

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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Reviewers: Kori Blankenship, Andrea Laliberte

Vegetation Type

Shrubland

Map Zones

4, 6, 12, 13, 14, 15, 17, 24, 25

Geographic Range

Found in the Mojave and lower Sonoran Deserts. Found as fingers within map zone (MZ) 12 and MZ17, e.g., in the Parahnagat Valley.

Biophysical Site Description

Creosotebush scrub is wide-ranging across the warm deserts and is most common in the Mojave Desert. Creosotebush scrub is typically found below the blackbrush zone on well-drained alluvial flats and slopes and above the saltbush zone. Elevations range from 500-6,000ft on lower mountain footslopes. Most of the valleys and basins in this area range between 2,000-4,000ft.

Creosote shrublands occur on several soil types from shallow to deep. The site occurs on erosional fan remnants, fan piedmonts, and sideslopes of hills and lower mountains. Slopes range from 2-75%, but slope gradients of 2-15% are typical. Desert pavement is common. Soils are predominantly well drained, available water capacity is very low, and runoff is moderate to rapid.

Average annual precipitation ranges from 3-7 inches. Precipitation occurs primarily during the winter and early spring. In the eastern Mojave, high-intensity convection summer storms (July and August) occur frequently enough to influence the production and species composition of most native plant communities. The relative humidity is low, evaporation is high, solar radiation is high, and the daily and seasonal range in temperature is wide. Average annual temperature ranges from 65°-75° F. Average frost-free period is generally 240 days.

Vegetation Description

Creosotebush (*Larrea tridentate*) and white bursage (*Ambrosia dumosa*) are typically dominants, but many different shrubs, dwarf-shrubs, and cacti may co-dominate or form typically sparse understories. Plant community associates change from east to west in the Mojave Desert. Co-dominants include saltbush (*Atriplex* spp.), white bursage (*Ambrosia dumosa*), ephedra (*Ephedra* spp.), wolfberry (*Lycium* spp.), and bladder sage (*Salazaria mexican*). Joshua trees (*Yucca brevifolia*) can be part of this community type and can form woodlands. Grass species include galleta grass (*Pleuraphis rigida*), bush muhly (*Muhlenbergia porteri*), desert needlegrass (*Achnatherum speciosum*), Indian ricegrass (*Achnatherum hymenoides*), and threeawn (*Aristida* spp.).

Creosotebush scrub is characterized by low cover (5-30%) of woody shrubs of various heights. With the exception of Joshua tree, creosotebush has the highest cover and is the most wide-ranging plant species in the Mojave Desert.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| AMDU2 | *Ambrosia dumosa* | Burrobush |
| LATR2 | *Larrea tridentata* | Creosote bush |
| EPNE | *Ephedra nevadensis* | Nevada jointfir |
| ATRIP | *Atriplex* | Saltbush |
| LYCIU | *Lycium* | Desert-thorn |
| EPHED | *Ephedra* | Jointfir |

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

Disturbance Description

Creosotebush scrub is not fire-tolerant because of its drought-tolerant features such as thin bark, slow growth, shallow root system, and small leaves. Although some associated species resprout after fire depending on fire severity, the creosotebush scrub community is slow to recover or reestablish after fire.

We do not know the pre-settlement fire conditions in warm desert plant communities. However, it is thought that fires in creosotebush scrub were absent to rare events in pre-settlement desert habitats, because fine fuels from winter annual plants were probably sparse, only occurring in large amounts during the spring following exceptionally wet winters.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 330 | 100 | 300 | 1000 |
| Moderate (Mixed) |  |  |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 330 | 100 |  |  |

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

Patch sizes, which can be very large (>100,000ac), vary according to landform, aspect, and precipitation. Fires were small (<100ac) and rare.

Adjacency or Identification Concerns

The adjacency/identification issue is not as much of a concern as in other systems because creosote communities dominate the Mojave landscape. This Biophysical Setting (BpS) may be adjacent to Sonoran Mid-Elevation Desert Scrub (10910).

Fine fuel from alien annual grasses such as red brome or cheatgrass currently represent the most important fuel-bed component in creosotebush scrub. In years of good moisture, alien annual grasses can comprise 66-97% of the total annual biomass in this system.

Historical year-round livestock grazing has contributed to the deterioration of this system.

Issues or Problems

Little information is available regarding fire frequency and fire severity in pre-settlement fire conditions in warm desert plant communities.

Native Uncharacteristic Conditions

Cover of shrub >30% (remote sensing) is considered uncharacteristic.

Comments

During the 2016 model review, three variants of this BpS were reviewed by Andrea Laliberte. Laliberte noted that the descriptions for all zones were very similar and that the models were identical. She recommended that all zones be combined and suggested adjustments to the s-class structure to improve mappability. Also during the review, Kori Blankenship changed the Late1 Closed to Late1 Closed mixed-severity fire transition to replacement severity to comply with LANDFIRE fire severity definitions. LANDFIRE defines replacement-severity fire as a fire that topkills >75% of the upper-layer lifeform. Because creosotebush is typically killed by fire (Marshall 1995), Blankenship assumed that the modelers used mixed fire in the Late1 Closed state to represent a very patchy fire, but because where fire occurred it probably killed the cresotebush, it met LANDFIRE’s replacement fire criteria.

Patti Novak-Echenique was the primary model contributor for MZ4, MZ13, MZ14, MZ15, and MZ25. Gary Medlyn was the primary model contributor for MZ6, MZ12, MZ17, and MZ24. Jan Nachlinger (jnachlinger@tnc.org) reviewed the model for MZ04. Louis Provencher reviewed the model for the northern end of the BpS’s range.

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 | B | B | B | UN | UN | UN | UN | UN |
| Herb | 0.5-1.0 | A | A | B | B | B | UN | UN | UN | UN | UN |
| Herb | >1.0 | A | A | B | B | B | UN | UN | UN | UN | UN |
| Shrub | 0-0.5 | A | B | B | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | A | B | B | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | A | B | B | UN | UN | UN | UN | UN | UN | UN |
| Shrub | >3.0 | A | B | B | UN | UN | UN | UN | UN | UN | UN |
| Tree | 0-5 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 5-10 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 10-25 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | 25-50 | B | B | UN | UN | UN | UN | UN | UN | UN | UN |
| Tree | >50 | B | B | UN | UN | UN | 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 15 Early Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ARIST | Aristida | Threeawn | Lower |
| AMDU2 | Ambrosia dumosa | Burrobush | Low-Mid |
| LATR2 | Larrea tridentata | Creosote bush | Upper |
| HYSA | Hymenoclea salsola | Burrobrush | Low-Mid |

Description

Low-cover creosotebush scrub. Under historical 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 from native annuals.

*Maximum Tree Size Class*  
None

Class B 85 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| LATR2 | Larrea tridentata | Creosote bush | Upper |
| AMDU2 | Ambrosia dumosa | Burrobush | Low-Mid |
| EPHED | Ephedra | Jointfir | Low-Mid |
| LYCIU | Lycium | Desert-thorn | Low-Mid |

Description

Greater cover of shrubs, grasses, and forbs associated with more productive soils. Less fine fuels are associated with this community; therefore, fire is less likely.

*Maximum Tree Size Class*  
None

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Late1:CLS | 99 |
| Late1:CLS | 100 | Late1:CLS | 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** |
| Replacement Fire | Early1:OPN | Early1:OPN | 0.0033 | 303 | Yes | 0 |
| Replacement Fire | Late1:CLS | Late1:CLS | 0.0015 | 667 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:OPN | 0.0015 | 667 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:CLS | 0.013 | 77 | No | 0 |

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