

11350

Inter-Mountain Basins Semi-Desert Grassland

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
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None	None	None	None

Vegetation Type

Herbaceous

Map Zones

13, 14

Geographic Range

Occurs throughout the Intermountain western United States on sandsheets or stabilized dunes.

Biophysical Site Description

Ecological systems found at varying elevations in the Mojave Desert. 500-2,000m. Also found at lower elevations in Death Valley National Park. These grasslands occur in lowland and upland areas and may occupy sandsheets, stabilized dunes, swales, playas, mesatops, plateau parks, alluvial flats, and plains, but sites are typically xeric. Substrates are often excessively to 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. Sometimes associated with specific soils, often well-drained clay soils. These grasslands typically occur on aridic sites. These grasslands occur on a variety of aspects and slopes. Sites may range from flat to moderately steep. Annual precipitation is 4-8in in the Mojave Desert (map zone [MZ] 13). Monsoonal rains are an important source of precipitation.

Vegetation Description

Grasslands within this system are typically characterized by a sparse to moderately dense herbaceous layer dominated by medium-tall and short bunchgrasses. The dominant perennial bunchgrasses and shrubs within this system are all very drought-resistant plants. These grasslands are typically dominated or co-dominated by *Achnatherum hymenoides* or *Hesperostipa comata* and may include scattered shrubs and dwarf-shrubs of species of *Artemisia tridentata*, *Atriplex canescens*, *Ephedra*, or *Krascheninnikovia lanata*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
ACHY	<i>Achnatherum hymenoides</i>	Indian ricegrass
HECO26	<i>Hesperostipa comata</i>	Needle and thread
PLJA	<i>Pleuraphis jamesii</i>	James' galleta
ARTR2	<i>Artemisia tridentata</i>	Big sagebrush
GRSP	<i>Grayia spinosa</i>	Spiny hopsage
PLRI	<i>Pleopeltis riograndensis</i>	Rio grande scaly polypody

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

Disturbance Description

Two sources of fire exist for Great Basin grasslands in the Mojave Desert. 1) Fire occurred in these sites when adjacent shrublands (Biophysical Setting [BpS] 1079, 1080, 1082, 1087) burned under extreme fire behavior conditions; however, the fire return interval (FRI) of these shrublands can be sufficiently long as to cause fire to be uncommon to rare (blackbrush has a FRI of 400yrs). Therefore, the disturbance dynamics of this system are identical to those of the dominant and surrounding BpS (perhaps blackbrush, 131082) with stand-replacing fires occurring every 400yrs due to the continuity of fine fuel. 2) The second source of fire is small 10-20ac burns that Native Americans set to flush rabbits and jackrabbits for hunting purposes. These fires would be stand-replacing. Uncertainty exists about the estimated FRI. It was assumed that fires were set during the peak of rabbit and jackrabbit cycles, which would be from 7-12yrs (10yrs chosen). Assuming that Native Americans burned 0.2% (20ac/10,000ac) of a grassland per day per year and burned on 30 days during the peak of the rabbit cycle every 10yrs (probability/yr = 0.1), then $0.002 \times 30 \times 0.1 = 0.006/\text{yr}$ or 166yr FRI. Reestablishment following fire is from resprouting grasses with shrubs reestablishing from seed over time. These two sources of fire were combined for technical purposes in the VDDT model.

Other disturbances included insects (e.g., moths and grasshoppers that eat leaves, moth larval grubs that eat roots; return interval of 75yrs), periods of drought and wet cycles, and shifts in climate corresponding to extended wet and dry cycles oscillating every two to three decades related to the Pacific Decadal Oscillation (PDO) with the influence of these longer-term patterns moderated by short-term variation associated with El Niño and La Niña patterns (return interval of 30yrs). We assumed that 60% of times the effect of drought/wet cycles was stand-thinning for shrubs (probability/yr = 0.02), whereas 40% of times the effect was stand-replacing for shrubs (probability/yr = 0.013).

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	117	100		
Moderate (Mixed)				
Low (Surface)				
All Fires	117	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

Semi-desert grassland can be large (>10,000ac) when associated with extensive sandsheet systems. Historic disturbance (fire) likely ranged from small (10-20ac) when set by Native Americans during the peak of rabbit and jackrabbit cycles (10yr cycle) and large (>1,000ac) and infrequent when fire spread from adjacent shrublands under extreme fire conditions.

Adjacency or Identification Concerns

NatureServe description for BpS 1135 includes Muhlenbergia-dominated grasslands which flood temporarily. Muhlenbergia grasslands and flooding are not part of these sandy systems in Nevada.

Found adjacent to several BpSs: 131079, 131080, 131082, and 131087.

Many of these sites were impacted by introduced grazing animals post-European settlement and have been converted to shrub-dominated systems.

Red brome and Mediterranean grass (both *Schismus arabicus* and *barbatus*) are present in these ecological systems and can dominate disturbed high-sand content areas. In addition, noxious weeds, such as Sahara mustard (*Brassica tournifortii*) are present and increasing.

Issues or Problems

The scale of historic fire is unknown, and numbers provided are a guess. Native burning was important for hunting, but the calculation of an FRI involved two critical assumptions about area burned and lagomorph cycles.

Native Uncharacteristic Conditions

Herbaceous cover is rarely >50%; however, grass cover can reach higher values where bunchgrasses are dense (75% cover). Shrub cover >30% is uncharacteristic.

Comments

MZs 13 and 14 were combined during 2015 BpS Review.

BpS 131135 is fundamentally different from 121135 because the surrounding desert scrub landscape cannot be the source of frequent fire. Louis Provencher (lprovencher@tnc.org) added Native American burning to the model based on input from Mojave Desert anthropologist Dr. Kay Fowler from University of Nevada, Reno (csfowler@scs.unr.edu), with additional "guesstimates" for rabbit/jackrabbit cycles by Dr. Bill Longland (longland@unr.nevada.edu) and Dr. Peter Brussard (brussard@biodiversity.unr.edu). The effect of weather was also borrowed from the wet/drought cycles from BpS 131085, with the difference that the weather cycle was separated into severe 75yr events and less-severe 50yr events (for a total of 30yr weather events).

LANDFIRE National quality control of this model required combining the two sources of fire (both listed as "replacement fire") in VDDT. Their separate probabilities have been described for each vegetation class below.

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	B	B	B	B	B	B	B	B	B	B
Shrub	0.5-1.0	B	B	B	B	B	B	B	B	B	B
Shrub	1.0-3.0	B	B	B	B	B	B	B	B	B	B
Shrub	>3.0	B	B	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 31 Early Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ARTR2	Artemisia tridentata	Big sagebrush	Upper
HECO26	Hesperostipa comata	Needle and thread	Upper
ACHY	Achnatherum hymenoides	Indian ricegrass	Lower

Description

Perennial grasses and forbs dominate (generally 25-40% cover) where woody shrub canopy has been topkilled/removed by wildfire. Shrub cover is <5%.

Maximum Tree Size Class

None

Class B 69 Mid Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ARTR2	Artemisia tridentata	Big sagebrush	Upper
HECO26	Hesperostipa comata	Needle and thread	Low-Mid
ACHY	Achnatherum hymenoides	Indian ricegrass	Lower

Description

Shrubs compose the upper-layer lifeform with diverse perennial grass and forb understory dominant. Herbaceous layer is >25% cover. Severe drought/wet cycles events will cause stand-replacement for shrubs.

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
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Early1:OPN	0	Mid1:OPN	19
Mid1:OPN	20	Mid1: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
Replacement Fire	Early1:OPN	Early1:OPN	0.0085	118	Yes	0
Replacement Fire	Mid1:OPN	Early1:OPN	0.0085	118	Yes	0
Insects or Disease	Mid1:OPN	Mid1:OPN	0.013	77	No	0
Wind or Weather or Stress	Mid1:OPN	Early1:OPN	0.013	77	Yes	0
Wind or Weather or Stress	Mid1:OPN	Mid1:OPN	0.02	50	No	0

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