LANDFIRE Biophysical Setting Model

Biophysical Setting 2211350 Inter-Mountain Basins Semi-Desert Grassland

☐ *This BPS is lumped with:*
☐ *This BPS is split into multiple models:*

General Information

Contributors (also see the Comments field) **Date** 2/24/2005

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Modeler 2 **Reviewer**
Modeler 3 **Reviewer**

Vegetation Type
Upland Grassland/Herbaceous

General Model Sources
☑ Literature
☐ Local Data
☐ Expert Estimate

Dominant Species
BOGR2
ACHY
HECO26
ARIST
MUHLE

Map Zone
22

Model Zone
☐ Alaska
☐ California
☐
☐ Great Basin
☐ Great Lakes
☐ Hawaii
☐ Northeast
☐ Northern Plains
☐ N-Cent.Rockies
☑
☐ Pacific Northwest
☐ South Central
☐ Southeast
☐ S. Appalachians
☐ Southwest

Geographic Range
Occurs throughout the Intermountain western US on dry plains and mesas. This might occur in the southwestern portions of MZ22. However, all reviewers and modelers for MZ22 were confused by this system and why it was occurring in this mapzone and at such a high frequency. Most did not think it occurred in this mapzone. However, upon inspection of a draft ESP map, experts understood a bit more as to why it was occurring in this mapzone.

Biophysical Site Description
Ecological systems found at approximately 1450-2320m (4750-7610ft) 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. These grasslands typically occur on xeric sites. When they occur near foothill grasslands they will be at lower elevations. These grasslands occur on a variety of aspects and slopes. Sites may range from flat to moderately steep. Annual precipitation is usually from 20-40 cm (7.9-15.7 inches).

Vegetation Description
The Semi-desert grassland Indicator Species are common, widespread species.

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. The dominant perennial bunch grasses and shrubs within this system are all very drought-resistant plants. These

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grasslands are typically dominated or codominated by Achnatherum hymenoides, Aristida spp., Bouteloua gracilis, Hesperostipa comata,or Pleuraphis jamesii (for MZ22 - P jamesii only in the southern part of MZ22. The species does not occur, or at least is very rare, north of Interstate Hwy 80.) or Muhlenbergia sp. and may include scattered shrubs and dwarf-shrubs of species of Artemisia, Atriplex, Gutierrezia, or Krascheninnikovia lanata, Coleogyne (not in MZ22), Ephedra (not in MZ22). 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.

Disturbance Description

This system is maintained by frequent fires and sometimes associated with specific soils, often well-drained clay soils. Fire most often occurred in these sites, when adjacent shrublands burned. Fires were typically mixed (average FRI of 37yrs) and stand replacement (average FRI of 75yrs). Most species respond favorably to fire. Rabbitbrush tends to increase with spring and summer fires. (In MZ18, one reviewer sugggests deleting mixed severity fire. Other reviewers stated that mixed fire should remain. Because of the disagreement, mixed fire was left. Although mixed fire is not typical in a grassland system, the mixed severity fires were retained in this BpS due to the bunchgrasses and the possibility that in a 30-meter pixel, only partial topcover (since some is sand) would be topkilled.)

These sites were prone to flooding during high precipitation, resulting in erosion of topsoil and some short term loss of vegetative cover. (It is doubtful, at least in MZ22, if most of the sites are prone to flooding. That may be true of the lowland sites, but it seems highly unlikely for swales, mesa tops, plateau parks, and plains.) In cases of +500 yr flooding event, the site could downcut, thus lowering the water table, and favored woody species in an altered state. However, only on playas and stream terraces and floodplains would there be a water table that could be lowered. On upland sites, which the site description suggests constitute the majority of sites for this type, there is no water table.

Infrequent native grazing has occurred, which may have resulted in heavy defoliation, but was confined to small acreage and generally temporary in nature.

Drought cycles likely resulted in a reduction in vegetative cover, production and acreage of these sites. Drought negatively affected woody species (mean return interval of 100yrs).

Native Americans likely used these sites for camping and some vegetation collection, while hunting and gathering in adjacent wetlands. Humans likely caused heavy impacts to soils and vegetation in small campsites, but overall impact was light and transitory.

Adjacency or Identification Concerns

Found adjacent to wet meadows, wetlands, sagebrush uplands and salt desert shrublands. Sites adjacent to sagebrush uplands tended to burn more frequently than sites adjacent to wet or salt desert shrub.

Many of these sites were impacted by introduced grazing animals post-European settlement and have been converted to shrub dominated systems with soil compaction problems that tend toward an increase in tap-rooted forb species. Class D is found more frequently now, due to altered disturbance regimes with livestock grazing, changes in fire frequency, altered water flow and climate change.

Distinguishing these grasslands by floristics alone is challenging because the Semi-desert grassland Indicator Species are common, widespread species. In addition Indicator Species for the other grassland

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systems (Carex duriuscula, Carex filifolia, Danthonia intermedia, Danthonia parryi, Festuca arizonica, Festuca campestris, Festuca idahoensis, Festuca thurberi, Leucopoa kingii, Muhlenbergia filiculmis, Muhlenbergia montana, Nassella viridula) may be absent in degraded stands.

After inspection of a draft ESP map for MZ22, the intermingling of the 1135 and 1139 plots was suspect. However, it is thought that perhaps 1139 lies at higher elevations than 1135.

Native Uncharacteristic Conditions

Scale Description

These sites are generally small and often moist. Fire in these systems is usually introduced from adjacent shrublands or native burning to improve herbaceous understory.

Issues/Problems

The scale of historic fire is unknown and numbers provided are a guess.
All MZ22 modelers and reviewers were confused by this system and thought it did not occur in this mapzone and that it certainly did not occur with the frequency to which it was assigned in this mapzone. Most did not think this type occurred in MZ22.

Comments

This model was adopted as-is from the same BpS from MZ28 created by Bob Unnasch and reviewed by Vic Ecklunch, Chuck Kostecka and an anonymous reviewer.

For MZ28, this is nearly identical to the model for the same BpS in mapping zones 16, 23, 24. Minor species edits were made (Mike Babler, mbabler@tnc.org, 5/5/2005). Additional reviewers for mapping zone 18 were Mike Frary (mike_frary@blm.gov), Linda Kerr (linda_kerr@nps.gov), and Paul Langowski (plangowski@fs.fed.us).

This system is similar to the Great Basin Grassland (R2MGWAws) developed by Cheri Howell (chowell@fs.fed.us) and edited by Louis Provencher (lprovencher@tnc.org).

Vegetation Classes

Class A **5 %**

Early Development 1 Open

Upper Layer Lifeform

- [x] Herbaceous
- [ ] Shrub
- [ ] Tree

Fuel Model

1

Indicator Species and Canopy Position

BOGR2 Upper
ACHY Upper
HECO26 Upper

Upper

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	0 %	20 %
Height	Herb 0m	Herb 0.5m
Tree Size Class	None	

☐ Upper layer lifeform differs from dominant lifeform.

Description

Post fire, flood or drought early seral community. Bare ground is 10 to 30%.Total vegetative canopy cover is 0-25%. Relative forb cover is 10-40%. Relative graminoid cover is 60-90%. Shrub cover is minimal or non-existent.

Replacement fire (FRI of 75yrs) maintains the vegetation in A, whereas mixed severity fire (FRI of 37yrs),

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while occurring, does not change the successional age.

Rare flood events (mean return interval of 500-yr) moves the vegetation to a more shrubby condition, class D, after downcutting.

Succession is from class A to B after two years.

Class B **70 %**

Mid Development 1 Open

Upper Layer Lifeform

- [x] Herbaceous
- [ ] Shrub
- [ ] Tree

Fuel Model

1

Indicator Species and Canopy Position

BOGR2
Upper
ACHY
Upper
HECO26
Upper

Upper

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	21 %	80 %
Height	Herb 0.6m	Herb 1.0m
Tree Size Class	None	

- [ ] Upper layer lifeform differs from dominant lifeform.

Description

Mostly stable and resilient system. Bare ground is less than 10%. Total canopy cover is 25-80%. Relative cover of grasses is >85%. Relative cover of forbs is 0-5%. Relative cover of shrubs is 0-10%.

Replacement fire (mean FRI 75yrs) causes a transition to class A, whereas mixed severity (FRI of 37yrs), while active, does not affect the successional age of class B.

Weather and flooding affects this system in three different ways: 1) Recurring drought with a 100-yr return interval will thin vegetation and keep it open; 2) The site will be scoured, but not downcut, by 100-yr flood events causing a transition to class A; and 3) Rare 1000-yr flooding event will cause a downcut and alteration of the site towards a more permanent woody condition (class D).

Succession is from class B to C after 35yrs.

Class C **20 %**

Late Development 1 Open

Upper Layer Lifeform

- [ ] Herbaceous
- [x] Shrub
- [ ] Tree

Fuel Model

1

Indicator Species and Canopy Position

BOGR2
Lower
ACHY
Lower
HECO26
Upper

Upper

Structure Data (for upper layer lifeform)

	Min	*Max*
Cover	11 %	80 %
Height	Shrub 1.1m	Shrub 3.0m
Tree Size Class	None	

- [x] Upper layer lifeform differs from dominant lifeform.

ERNA10, or ARTRT 10-75%,ht 1-3 m

Description

This system differs from mid-open by an increase in the shrub cover component. Bare ground is <10%. Total canopy cover is 50-80%. Relative cover of grasses is 25-50%. Relative cover of forbs is 0-5% Relative cover of shrubs (most frequently rubber rabbitbrush and Basin big sagebrush) is 10-75%.

The dynamics of class C are similar to those of class B, except that drought causes a transition to class B (not class A) through the thinning of shrubs - 50yrs. Flooding occurs every 100yrs, as in B, and causes a

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transition to A, as in B.

Class C, unlike class B, experiences infrequent native grazing (browsing, 1/1000 probability/yr) that will reduce woody vegetation and cause a transition to class B.

Replacement fire every 75yrs; mixed fire every 35yrs, causing a transition to B.

This class persists.

Class D **5 %**

Mid Development 1 Closed

Upper Layer Lifeform

- ☐ Herbaceous
- ☑ Shrub
- ☐ Tree

Fuel Model

2

Indicator Species and Canopy Position

BOGR2
Lower
ACHY
Lower
HECO26
Upper

Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	81 %	100 %
Height	Shrub 1.1m	Shrub 3.0m
Tree Size Class	None	

☐ Upper layer lifeform differs from dominant lifeform.

Description

This is a combination of a mid and late closed stage. (This class starts at age one year because class A can transition to this class.) This system differs from mid-open by a significant increase in the shrub cover component. Bare ground is <20%. Total canopy cover can exceed 100% due to shrub dominance. Relative cover of grasses is <25%. Relative cover of forbs is 0-5%. Relative cover of shrubs (most frequently rubber rabbitbrush and Basin big sagebrush) is >75%.

Replacement fire (FRI of 75yrs) and 100-yr flood event are the only disturbances causing a transition to class A. Mixed severity fire (average FRI of 37yrs) opens the stand, but maintain in a woody state (transition to class C).

Class D is likely less than 5%. This class persists.

Class E **0 %**

[Not Used] [Not Used]

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☐ Tree

Fuel Model

Indicator Species and Canopy Position

Structure Data (for upper layer lifeform)

	Min	Max
Cover	%	%
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Disturbances

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Fire Regime Group:** I

Historical Fire Size (acres)

Avg 100
Min 1
Max 500

Sources of Fire Regime Data

- [x] Literature
- [x] Local Data
- [x] Expert Estimate

Fire Intervals

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	75	40	110	0.01333	33
Mixed	37	20	54	0.02703	67
Surface					
All Fires	25			0.04037	

Fire Intervals (FI):

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inverse of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class.

Additional Disturbances Modeled

- [ ] Insects/Disease
- [x] Native Grazing
- [ ] Other (optional 1)
- [x] Wind/Weather/Stress
- [ ] Competition
- [ ] Other (optional 2)

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