

LANDFIRE Biophysical Setting Model

Biophysical Setting 1011250

Inter-Mountain Basins Big Sagebrush Steppe

- This BPS is lumped with:
 This BPS is split into multiple models:

General Information

Contributors (also see the Comments field)

Date 11/18/2005

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Vegetation Type

Upland Shrubland

Dominant Species

ARTRT
ARTRW8
HECO26
ELTR7

Map Zone

10

Model Zone

- | | |
|--------------------------------------|---|
| <input type="checkbox"/> Alaska | <input type="checkbox"/> Northern Plains |
| <input type="checkbox"/> California | <input checked="" type="checkbox"/> N-Cent. Rockies |
| <input type="checkbox"/> Great Basin | <input type="checkbox"/> Pacific Northwest |
| <input type="checkbox"/> Great Lakes | <input type="checkbox"/> South Central |
| <input type="checkbox"/> Hawaii | <input type="checkbox"/> Southeast |
| <input type="checkbox"/> Northeast | <input type="checkbox"/> S. Appalachians |
| | <input type="checkbox"/> Southwest |

General Model Sources

- Literature
 Local Data
 Expert Estimate

Geographic Range

This widespread matrix-forming ecological system occurs throughout much of the Columbia Plateau, northern Great Basin, and plains of MT and WY.

Biophysical Site Description

This type is found between 3000-7000ft elevation. Soils are typically deep and non-saline, often with a microphytic crust.

Vegetation Description

A moderately dense canopy of basin big sagebrush (*Artemisia tridentata* spp. *Tridentata*) with *Artemisia tridentata* ssp *wyomingensis*, and/or *Purshia tridentata* codominating. *Atriplex confertifolia*, *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*, or *Tetradymia* spp may be common especially in disturbed stands.

The herbaceous understory will have cover >25%. Understory grasses include slender wheatgrass (*Pseudoroegneria spicata*), Thurber needlegrass, (*Achnatherum thurberianum*), needle and thread (*Hesperostipa comata*), basin wildrye (*Leymus cinerius*), squirreltail (*Elymus elymoides*), western wheatgrass (*Pascopyrum smithii*), bluebunch wheatgrass (*Pseudoroegneria spicata*). Forbs are typically sparse, and include *Phlox hoodii*, *Arenaria* spp., *Astragalus* spp., hawskbeard (*Crepis acuminata*), bird's beak (*Cordylanthus* spp.), blue bell (*Mertensia* spp.), lupine (*Lupinus* spp.), and buckwheat (*Eriogonum* spp.).

**Fire Regime Groups are: I: 0-35 year frequency, surface severity; II: 0-35 year frequency, replacement severity; III: 35-100+ year frequency, mixed severity; IV: 35-100+ year frequency, replacement severity; V: 200+ year frequency, replacement severity.

Disturbance Description

Fire regime group IV, but may also encompass III and IV. Fire return intervals are estimated to average approximately 60yrs, and range from 10-150yrs. However, questions have recently been raised about the frequency of fire as related to neighboring vegetation types (Baker 2004, in press). Fires were mostly replacement severity (Tirmenstein 1999). Mixed severity fire was probably present where fuels were discontinuous, though there is disagreement about the role of replacement fire in this type. Ignition sources probably included native burning under reference conditions (Barrett and Arno 1982, 1999).

Drought may have caused replacement disturbances rarely (e.g., once every 1000yrs) and mixed-severity disturbance more frequently (e.g., once every 50yrs). Under current conditions, drought has recently cause approximately 20% mortality in some portions of Wyoming.

Insects and disease would have been replacement and mixed-severity disturbances in this type, but little information exists on the frequency of these disturbances under reference conditions. They are not modeled here.

Native grazing by large ungulates, including bison, elk, mule deer, and pronghorn would have maintained open conditions and caused rare, small degraded sites (i.e., wallows) that may have occupied <5% of the landscape. This disturbance is not modeled here.

Adjacency or Identification Concerns

Basin big sagebrush grows in association with Wyoming big sagebrush, mountain big sagebrush, and desert shrub communities. Distribution is a result of local soil characteristics on a fine scale (1-500 acres). Much of this type has been lost due to land clearing for agriculture or converted to a cheatgrass or greasewood type.

This BpS may be similar to the Rapid Assessment PNVG R2SBBB for the Great Basin model zone, but has some differences due to geographic variability.

Native Uncharacteristic Conditions

Scale Description

Fuels may be continuous resulting in spread throughout patches. Disturbance size therefore probably resembles the patch size of the vegetation.

Issues/Problems

It is difficult to map and identify the subspecies of big sagebrushes (*Artemisia tridentata*) without the aid of field assessments.

Comments

This model was adopted as-is, with only slight modifications to the description, from the Rapid Assessment model R0SBBB. Additional reviewers of the Rapid Assessment model were Karen Clause (karen.clause@wy.usda.gov), Dennis Knight (dhknight@uwoyo.edu); Thor Stephenson (thor_stephenson@blm.gov), Curt Yanish (curt_yanish@blm.gov), and Gavin Lovell (gavin_lovell@blm.gov); and Eve Warren (eve_warren@blm.gov).

There was considerable disagreement among Rapid Assessment reviewers about how to model this type. All comments were incorporated into the description. The following changes were made to the quantitative model based on peer review:

**Fire Regime Groups are: I: 0-35 year frequency, surface severity; II: 0-35 year frequency, replacement severity; III: 35-100+ year frequency, mixed severity; IV: 35-100+ year frequency, replacement severity; V: 200+ year frequency, replacement severity.

-mixed severity fire was added to the model without changing the overall MFI. Several reviewers agreed that mixed fire should be included, though they disagreed at what proportion.
 -drought was added as a disturbance agent, causing both replacement type disturbances (once in 1000yrs) and mixed-severity disturbances (once every 50yrs).
 -the proportion of fire was redistributed among the three classes so that class B had a higher likelihood of fire than class A or C.
 These changes resulted in the following changed results in the model: class A changed from 30% to 20%; class B changed from 40% to 30%; class C changed from 30% to 50%.

The following items reviewers disagreed upon or did not have data to support and so were not included in the model, but were added to the description:
 -the frequency and severity of insects, disease, and native grazing disturbances.
 -whether or not two additional classes (mid-closed and late-open) should be added.
 -the frequency of fire in this system. Estimates ranged from 40yrs to 150yrs. The model was left at an overall MFI of 60yrs, as several reviewers agreed upon this number.

Vegetation Classes

Class A 20 %	Indicator Species and Canopy Position	Structure Data (for upper layer lifeform)	
		<i>Min</i>	<i>Max</i>
Early Development 1 All Structure	LECI4	Cover	0 % 10 %
Upper Layer Lifeform		Height	Shrub 0m Shrub 1.0m
<input type="checkbox"/> Herbaceous	ELTR7	Tree Size Class	no data
<input checked="" type="checkbox"/> Shrub		<input checked="" type="checkbox"/> Upper layer lifeform differs from dominant lifeform.	
<input type="checkbox"/> Tree Fuel Model	HECO26	Vegetation is primarily herbaceous (>25% cover) with a few scattered shrubs (typically <5% cover).	
	SAVE4		

Description
 Grass-dominated community. If soils are alkaline, resprouting greasewood may also be present. This class lasts up to 20yrs post disturbance and succeeds to mid-development open (class C) unless drought or replacement fire cause stand-replacing disturbance.

Class B 30 %	Indicator Species and Canopy Position	Structure Data (for upper layer lifeform)	
		<i>Min</i>	<i>Max</i>
Late Development 1 Closed	ARTRT	Cover	31 % 60 %
Upper Layer Lifeform		Height	Shrub 0m Shrub 1.0m
<input type="checkbox"/> Herbaceous	ELTR7	Tree Size Class	no data
<input checked="" type="checkbox"/> Shrub		<input type="checkbox"/> Upper layer lifeform differs from dominant lifeform.	
<input type="checkbox"/> Tree Fuel Model	HECO26		
	SAVE4		

Description
 Mature and overmature sagebrush with suppressed understory. Cover will rarely exceed 40%. This condition begins at age 50 and can perpetuate until disturbance causes a transition to another class. Replacement fire and drought may cause a transition to class A. Mixed severity fire will cause a transition to class C, but is relatively rare.

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Class C 50 %

Mid Development 1 Open

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model

Indicator Species and Canopy Position

ARTRT

HECO26

SAVE4

LECI4

Structure Data (for upper layer lifeform)

	<i>Min</i>	<i>Max</i>
Cover	11 %	30 %
Height	Shrub 0m	Shrub 1.0m
Tree Size Class	no data	

Upper layer lifeform differs from dominant lifeform.

Description

Sagebrush dominated open shrub community with abundant grasses. This class lasts approximately 20-50yrs post disturbance and succeeds to late-development closed (class B) unless replacement fire or drought cause a transition to class A. Mixed severity fire maintains this condition.

Class D 0 %

[Not Used] [Not Used]

Upper Layer Lifeform

- Herbaceous
- Shrub
- Tree

Fuel Model

Indicator Species and Canopy Position

Structure Data (for upper layer lifeform)

	<i>Min</i>	<i>Max</i>
Cover	%	%
Height		
Tree Size Class		

Upper layer lifeform differs from dominant lifeform.

Description

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)

	<i>Min</i>	<i>Max</i>
Cover	%	%
Height		
Tree Size Class		

Upper layer lifeform differs from dominant lifeform.

Description

Disturbances

**Fire Regime Groups are: I: 0-35 year frequency, surface severity; II: 0-35 year frequency, replacement severity; III: 35-100+ year frequency, mixed severity; IV: 35-100+ year frequency, replacement severity; V: 200+ year frequency, replacement severity.

Fire Regime Group:** III

Historical Fire Size (acres)

Avg

Min

Max

Sources of Fire Regime Data

- Literature
- Local Data
- Expert Estimate

Additional Disturbances Modeled

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

Fire Intervals	<i>Avg FI</i>	<i>Min FI</i>	<i>Max FI</i>	<i>Probability</i>	<i>Percent of All Fires</i>
<i>Replacement</i>	100	10	150	0.01	60
<i>Mixed</i>	150			0.00667	40
<i>Surface</i>					
<i>All Fires</i>	60			0.01668	

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.

References

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