**LANDFIRE Biophysical Setting Model**

**Biophysical Setting 1911250**  Inter-Mountain Basins Big Sagebrush Steppe

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

### General Information

<table>
<thead>
<tr>
<th>Contributors</th>
<th>Date</th>
<th>Reviewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modeler 1</td>
<td></td>
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<tr>
<td>Modeler 2</td>
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<tr>
<td>Modeler 3</td>
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</tbody>
</table>

**Model Zones**

- [ ] Alaska
- [ ] California
- [ ] Great Basin
- [ ] Great Lakes
- [ ] Hawaii
- [ ] Northeast
- [ ] Northern Plains
- [ ] N-Cent.Rockies
- [ ] Pacific Rockies
- [ ] Pacific Northwest
- [ ] South Central
- [ ] Southeast
- [ ] S. Appalachians
- [ ] Southwest

**Vegetation Type**

- Upland Shrubland

**Vegetation Type**

- Dominant Species
  - ARTRT
  - ARTRW8
  - HECO26
  - ELTR7

**Map Zone**

- 19

**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) and bluebunch wheatgrass (Pseudoroegneria spicata). Forbs are typically sparse, and include Phlox hoodii, Arenaria spp, Astragalus spp, hawkweed (Crepis acuminata), bird's beak (Cordylanthus spp), blue bell (Mertensia spp), lupine (Lupinus spp) and buckwheat (Eriogonum spp).

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**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 fuel 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 (eg, once every 1000yrs) and mixed-severity disturbance more frequently (eg, once every 50yrs). Under current conditions, drought has recently cause approximately 20% mortality in some portions of WY.

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 (ie, wallows) that may have occupied less than five percent 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 (1-500ac). 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

Fuel 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 (Artemesia 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@uwyo.edu), Thor Stephenson (thor_stephenson@blm.gov), Curt Yanish (curt_yanish@blm.gov), 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.
1) 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.
2) Drought was added as a disturbance agent, causing both replacement type disturbances (once in 1000yrs) and mixed-severity disturbances (once every 50yrs).
3) 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:
1) The frequency and severity of insects, disease, and native grazing disturbances.
2) Whether or not two additional classes (mid-closed and late-open) should be added. 3) 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**

<table>
<thead>
<tr>
<th>Vegetation Classes</th>
<th>Indicator Species and Canopy Position</th>
<th>Structure Data (for upper layer lifeform)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class A 20 %</strong></td>
<td>LECI4</td>
<td>Min</td>
</tr>
<tr>
<td>Early Development 1 All Structure</td>
<td>ELTR7</td>
<td>Max</td>
</tr>
<tr>
<td>Upper Layer Lifeform</td>
<td></td>
<td>Cover 0 %</td>
</tr>
<tr>
<td>□ Herbaceous</td>
<td></td>
<td>10 %</td>
</tr>
<tr>
<td>✗ Shrub</td>
<td></td>
<td>Height Shrub 0m</td>
</tr>
<tr>
<td>□ Tree</td>
<td></td>
<td>Shrub 1.0m</td>
</tr>
<tr>
<td>Fuel Model</td>
<td></td>
<td>Tree Size Class no data</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Class B 30 %**   | ARTRT                                 | Min                                      |
| Late Development 1 Closed | ELTR7                                 | Max                                      |
| Upper Layer Lifeform |                                       | Cover 31 %                              |
| □ Herbaceous       |                                       | 60 %                                     |
| ✗ Shrub            |                                       | Height Shrub 0m                          |
| □ Tree             |                                       | Shrub 1.0m                              |
| Fuel Model         |                                       | Tree Size Class no data                  |
| **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. |

**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.**
Disturbances

Sagebrush dominated open shrub community with abundant grasses. This class lasts approximately 20-50 yrs 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.

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Fire Regime Group**: III

Historical Fire Size (acres)
- Avg 0
- Min 0
- Max 0

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

<table>
<thead>
<tr>
<th>Fire Intervals</th>
<th>Avg FI</th>
<th>Min FI</th>
<th>Max FI</th>
<th>Probability</th>
<th>Percent of All Fires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replacement</td>
<td>100</td>
<td>10</td>
<td>150</td>
<td>0.01</td>
<td>60</td>
</tr>
<tr>
<td>Mixed</td>
<td>150</td>
<td></td>
<td></td>
<td>0.00667</td>
<td>40</td>
</tr>
<tr>
<td>Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Fires</td>
<td>60</td>
<td></td>
<td></td>
<td>0.01668</td>
<td></td>
</tr>
</tbody>
</table>

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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