**LANDFIRE Biophysical Setting Model**

**Biophysical Setting** 1010471  
Northern Rocky Mountain Mesic Montane Mixed Conifer Forest

- **This BPS is lumped with:**
- **This BPS is split into multiple models:** Nearly pure cedar groves, with much longer fire return intervals, have been split from this system into BpS 10472.

**General Information**

<table>
<thead>
<tr>
<th>Contributors</th>
<th>Date</th>
<th>Model Zone</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

**Vegetation Type**
- Forest and Woodland

**General Model Sources**
- Literature
- Local Data
- Expert Estimate

**Dominant Species**
- PIMO
- LAOC
- PSME
- ABGR
- Thpl
- TSHE

**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**
- This BPS occupies maritime influenced sites in north-central to northern ID, northeastern WA and northwestern MT within the range of western red cedar.

**Biophysical Site Description**
- This BPS occurs on low to mid-elevation slopes within the montane mesic forest, generally on northerly aspects. It can also occur on east-facing slopes and lower slopes of west or south-facing aspects in most maritime settings. This is primarily the Thpl/Asca, Tshe/Asca, Thpl/Clun and Tshe/Clun habitat types, in north Idaho Fire Group 8.

**Vegetation Description**
- Vegetation composition will vary widely geographically, but is today dominated by Douglas-fir and grand fir with other mixed conifers. Western larch, western white pine, western hemlock and western red cedar may be present. Ponderosa pine (on warmest and driest sites, such as ridge-tops), Engelmann spruce and subalpine fir (on coldest sites) and pacific yew (on the most maritime sites) may be present. Today, the decline of white pine has led to the increase of grand fir and Douglas-fir in these forests, which have a high propensity to root rot.

In the northern extent of this system, this BPS was dominated by white pine and western larch with lesser components of Douglas-fir and grand fir. Today, white pine and western larch each comprise less than five percent of the relative canopy cover in the Idaho Panhandle National Forest (Art Zack, unpublished data). Historically, white pine may have occupied >30% of the relative canopy cover, and western larch may have occupied >10% (Art Zack, personal communication). On potassium limited soils, white pine
was historically dominant (>60%). The removal of white pine and western larch is due to the non-native blister rust, logging and fire suppression (see also Adjacency/Identification concerns).

This system represents some of the most productive forests in this region. Forests are typically even-aged with scattered residuals (ie, 1-3 fire-regenerated age classes present in patches) with moderately dense to dense stands.

This type corresponds with warm/moderate, moist grand fir, western redcedar and western hemlock habitat types (Pfister et al. 1977). Daubenmire and Daubenmire (1968) characterized upland red cedar associates as "Paxistima myrsinites union".

Understory associates may include Linnaea borealis, Paxistima myrsinites, Alnus incana, Acer glabrum, Spiraea betulifolia, Rubus parviflorus, Taxus brevifolia, Gymnocarpium dryopteris and Vaccinium membranaceum.

**Disturbance Description**

Fire Regime Group III or IV. Fires are mostly mixed severity (50-150 year frequency) with the wetter sites experiencing longer fire return intervals and higher severity fires (~200yr frequency) (Zack and Morgan 1994). Mixed fire regimes, however, are very complex and occur "along a gradient that may not necessarily be stable in space or time" (Agee 2005). In the Idaho Panhandle National Forest, Zack and Morgan (1994) found replacement fire intervals at 200yrs and total fire interval at 65yrs for these systems.

Less productive sites may be susceptible to insects or disease. Douglas-fir bark beetle will affect Douglas-fir or grand fir. Root rot will affect Douglas-fir, grand fir and subalpine fir.

**Adjacency or Identification Concerns**

This type is distinguished from BpS 10472 (Northern Rocky Mountain Western Hemlock-Western Red Cedar Forest: Cedar Groves) because it has a more diverse mix of species, is more upland, and has a much shorter MFI.

Vegetation composition has changed significantly from the historic conditions. White pine is almost non-existent today due to blister rust. Fire suppression and logging have also significantly reduced the amount of larch. Larch is particularly dependent on mixed severity fires, which have been readily suppressed.

Forest structure has also changed significantly in this system. In the Idaho Panhandle National Forest, forests were historically dominated by late-development conditions (40-50%). Today, they are dominated by mid-development conditions (>50%).

Northern Rocky Mountain Conifer Swamp (1161) late successional forests and pure cedar groves (10472) will be present in bottomlands and toeslopes.

**Native Uncharacteristic Conditions**

**Scale Description**

Scales of fires tended to be highly variable and extensive (tens of thousands of acres) in area (Agee 1993, Graham and Jain 2005). Landscapes will typically be mosaics of single age-class patches resulting from stand-replacement fires, especially at mid-slopes. Broad ridges and riparian stringers may include more mixed-age stands due to mixed severity fire regime.

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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.
Issues/Problems

Comments
Additional reviewer was Cathy Stewart (cstewart@fs.fed.us). Peer review resulted in modifications to the description and a slightly longer MFI (from 65yrs to 80yrs), but the change in MFI did not change the proportion in each class.

Based on the Rapid Assessment model ROMCCH by Kelly Pohl and reviewed by Steve Barrett and Pat Green. One reviewer suggested referencing the following historical document: John B. Leiberg. Nineteenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1987-98, Part V-Forest Reserves. However, due to time constraints recovery and incorporation of this document was not possible.

10/01/07: As a result of final QC for LANDFIRE National by Kori Blankenship the user-defined min and max fire return intervals for mixed severity fire were deleted because they were not consistent with the modeled fire return interval for this fire severity type.

Vegetation Classes

<table>
<thead>
<tr>
<th>Class</th>
<th>%</th>
<th>Description</th>
<th>Indicator Species and Canopy Position</th>
<th>Structure Data (for upper layer lifeform)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A</td>
<td>15 %</td>
<td>Early Development 1 All Structure</td>
<td>CEVE, Upper</td>
<td><strong>Cover</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Herbaceous</td>
<td>SASC, Upper</td>
<td>0 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shrub</td>
<td>LAOC, Upper</td>
<td><strong>Height</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tree</td>
<td>PIMO, Upper</td>
<td><strong>Tree Size Class</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fuel Model</td>
<td>Middle</td>
<td>Upper</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Post-fire vegetation is shrub dominated with some seedling and sapling trees present. Establishment of western or paper birch, quaking aspen or black cottonwood is favored by fires that remove the duff layer (Williams et al. 1995). After 20yrs, this class succeeds to mid-development closed (class B).

<table>
<thead>
<tr>
<th>Class B</th>
<th>30 %</th>
<th>Mid Development 1 Closed</th>
<th>PIMO, Upper</th>
<th><strong>Cover</strong></th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Herbaceous</td>
<td>LAOC, Upper</td>
<td>61 %</td>
<td>100 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shrub</td>
<td>ABGR, Upper</td>
<td><strong>Height</strong></td>
<td>Tree 5.1m</td>
<td>Tree 25m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tree</td>
<td>PSME, Upper</td>
<td><strong>Tree Size Class</strong></td>
<td>Medium 9-21”DBH</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fuel Model</td>
<td></td>
<td>Upper</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
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</tbody>
</table>

Pole and medium sized trees of mixed conifer species have overtopped the shrubs and dominate the site. Canopy cover is dense (will often be 100%). At 65yrs post-fire, this class succeeds to late-closed (class E). Western red cedar and western hemlock may be present in the understory. White pine, western larch, grand fir and Douglas-fir will be present in the overstory. Subalpine fir or Engelmann spruce may be important.

**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.**
seral species on cooler sites (Williams et al. 1995).

<table>
<thead>
<tr>
<th>Class C 5%</th>
<th>Indicator Species and Canopy Position</th>
<th>Structure Data (for upper layer lifeform)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PIMO Upper LAOC Upper THPL Low-Mid ABGR Upper</td>
<td>Min 0% Max 60% Height Tree 5.1m Tree 25m Tree Size Class Medium 9-21&quot;DBH</td>
</tr>
</tbody>
</table>

**Description**

Open canopy conditions may be a result of topoedaphic conditions or disturbances. Mixed severity fires result in open, patchy stand conditions, and favor western larch and white pine. This condition will succeed to mid-development closed (B) after 20yrs, unless mixed severity fires maintain the open condition. Seedling/sapling western red cedar and western hemlock will be present in the understory.

<table>
<thead>
<tr>
<th>Class D 10%</th>
<th>Indicator Species and Canopy Position</th>
<th>Structure Data (for upper layer lifeform)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PIMO Upper LAOC Upper THPL Upper ABGR Upper</td>
<td>Min 0% Max 60% Height Tree 25.1m Tree &gt;50.1m Tree Size Class Very Large &gt;33&quot;DBH</td>
</tr>
</tbody>
</table>

**Description**

Open canopy conditions are rare and may be a result of topoedaphic conditions or disturbances. Mixed severity fires result in open, patchy stand conditions. Western red cedar and western hemlock will be codominant with western white pine, western larch, and grand fir. Seedling/sapling western red cedar and grand fir will be present in the understory. After 30yrs, this condition succeeds to late-development closed (E).

<table>
<thead>
<tr>
<th>Class E 40%</th>
<th>Indicator Species and Canopy Position</th>
<th>Structure Data (for upper layer lifeform)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>THPL Upper TSHE Upper PSME Upper ABGR Upper</td>
<td>Min 61% Max 100% Height Tree 25.1m Tree &gt;50.1m Tree Size Class Very Large &gt;33&quot;DBH</td>
</tr>
</tbody>
</table>

**Description**

Late-development closed conditions are multi-storied, dense canopies. Understories will tend to be depauperate due to dense overstory. Large woody debris is abundant caused by in-stand competition. Fuel

**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.
loadings range from 18-40 tons/acre (Kapler-Smith and Fischer 1995). This class will shift to open conditions with mixed severity fire or disease. Root rot will affect Douglas-fir and grand fir in patches.

### Disturbances

<table>
<thead>
<tr>
<th>Fire Regime Group**:</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical Fire Size (acres)</td>
<td>Avg 500</td>
</tr>
<tr>
<td></td>
<td>Min 5</td>
</tr>
<tr>
<td></td>
<td>Max 3000</td>
</tr>
</tbody>
</table>

**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>200</td>
<td>150</td>
<td>500</td>
<td>0.005</td>
<td>40</td>
</tr>
<tr>
<td>Mixed</td>
<td>133</td>
<td></td>
<td></td>
<td>0.00752</td>
<td>60</td>
</tr>
<tr>
<td>All Fires</td>
<td>80</td>
<td></td>
<td></td>
<td>0.01253</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.

### Additional Disturbances Modeled

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

### References


**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.


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