LANDFIRE Biophysical Setting Model

Biophysical Setting **1010451** **Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest - Ponderosa Pine-Douglas-fir**

☐ *This BPS is lumped with:*

☑ *This BPS is split into multiple models:* *This BpS is split into three types based on dominance: one dominated by ponderosa pine with Douglas-fir; one dominated by western larch; and one dominated by grand fir.*

General Information

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Vegetation Type

Forest and Woodland

General Model Sources

☑ Literature
☐ Local Data
☑ Expert Estimate

Dominant Species

PIPO
PSME
PICO
CARU
CAGE
PHMA5
ABGR
LAOC

Map Zone

10

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

Northern Rocky Mountains in western MT, eastern WA and northern ID, extending south to the Great Basin.

Biophysical Site Description

Generally found in the montane zone on well-drained, thin soils, generally on relatively warm, steep settings in the non-maritime influenced portion of the mapping zones. Elevation ranges from >4000ft in the southern area and >2500ft in the northern extent. Sites can range from nearly flat to steep on all aspects.

Common habitat types include: PSME/CARU - all phases, PSME/PHMA, PSME/SYAL, ABGR/LIBO and ABGR/XETE

Vegetation Description

Ponderosa pine is generally the dominant species on southerly aspects and drier sites, with Douglas-fir dominating on northerly aspects. Southerly aspects support relatively open stands. Northerly aspects support more closed stands. On mesic sites with longer fire return intervals, Douglas-fir often co-dominates the upper canopy layers. In the absence of fire, Douglas-fir and grand fir dominate stand understories. Western larch and lodgepole pine may also be present and become more abundant throughout the northern range of the BpS.

**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.

Understory can be dominated by shrubs such as ceanothus, ninebark, spiraea, willow and ocean spray, or open grass dominated by carex and pinegrass. Ninebark can have high cover (>30%) in some stands.

Disturbance Description

Consists of Fire Regime Groups I and III with surface and mixed severity fires at varying intervals (MFIs range from 7-80yrs). Occasional replacement fires may also occur. Mixed severity fire increases and surface fires decrease further north and higher elevations.

Insects and disease play an important role, especially in the absence of fire. Bark beetles such as mountain pine beetle, western pine beetle, and Douglas-fir beetle are active in the mid and late structural stage, especially in closed canopies. Weather related disturbances, including drought, tend to affect the late closed structure more than other structural stages.

Root rot is a minor concern in the northern extent of this BpS.

Mistletoe is present in the southern portion of this BpS and increases in occurrence with a lack of fire.

Adjacency or Identification Concerns

The mixed conifer zone in the Northern Rockies is broad, and represents a moisture gradient that affects fire regimes and species dominance. The Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland system was thus split into three BpS to represent differences in species dominance and fire regimes. 10451 represents the drier sites and is dominated by ponderosa pine and Douglas-fir with a very frequent, low severity fire regime. 10452 is dominated by western larch and represents slightly more mesic sites. The fire regime is dominated by moderately frequent, mixed severity fires. 10453 is dominated by grand fir and represents more mesic, cool sites with longer mixed severity fire regimes.

At lower elevations or southerly aspects, this type generally borders dry ponderosa pine or shrub systems. At higher elevations or northerly aspects, it borders larch, grand fir, spruce, and subalpine fir. At ecotones, it may be very difficult to distinguish between this BpS and 1053 (Northern Rocky Mountain Ponderosa Pine Woodland) in mid and late closed seral states.

This BpS corresponds to Pfister et al. (1977) and Steele et al. (1981) warm dry Douglas-fir (PSME/AGSP, PSME/ARUV PSME/FESC, PSME/SPBE and PSME/SYAL) and grand fir habitat types (ABGR/PHMA and ABGR/SPBE). In the western portion of MZ10, this type may occupy portions of habitat type PSME/SYOR.

This BpS generally occupies moderate environmental settings between more xeric ponderosa pine or shrub communities at lower elevations and moist grand fir or Douglas-fir communities at higher elevations.

Because of fire suppression, xeric ponderosa pine types may be disproportionally invaded by Douglas-fir today. It may be especially difficult in fire suppressed areas to distinguish between ponderosa pine and ponderosa pine-Douglas-fir BpS. It is also very difficult to distinguish between this BpS and the 1053 (Northern Rocky Mountain Ponderosa Pine Woodland) mid and late closed seral states.

Native Uncharacteristic Conditions

Canopy closure of >80% is considered to be uncharacteristic for this BpS.

**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.

Scale Description

Patch sizes were probably highly variable. Surface and mixed severity fires may have been variable in size (10s to 100s of acres).

Issues/Problems

In the northern range of this BpS, the younger age/size classes (class A, B and C) may be more extensive owing to larger and more frequent mixed or stand-replacement fires (relative to surface fires).

This type is extensive on the Colville National Forest, but has not been captured adequately in previous national mapping projects.

Comments

Additional reviewers included Cathy Stewart (cstewart@fs.fed.us), Pat Green (pgreen@fs.fed.us), Steve Rawlings (srawlings@fs.fed.us), Catherine Phillips (cgphillips@fs.fed.us), Lyn Morelan (lmorlan@fs.fed.us), Susan Miller (smiller03@fs.fed.us) and Steve Barrett (sbarrett@mtdig.net).

Peer review resulted in changes to the description and a slight reduction in the overall fire frequency (from 15yrs to 20yrs).

This BpS was adapted from RA PNVG R0PPDF by Lynette Morelan and Jane Kapler Smith, which was reviewed by Pat Green, Cathy Stewart and Steve Barrett. Modifications to the Rapid Assessment model included a slightly increased fire frequency (from approximately 20yrs to 15yrs). Relative proportions of surface, mixed and replacement fire were unchanged. The resulting percentages in classes C and D changed slightly.

The Rapid Assessment included two additional grand fir types. There was some disagreement among modelers and reviewers about whether two or three types should be developed from this BpS to capture slight differences in fire regimes. The BpS was not split at that time.

Vegetation Classes

Class A 10 %

Early Development 1 All Structure

Upper Layer Lifeform

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

Fuel Model

Indicator Species and Canopy Position

PIPO
Upper
LAOC
Upper
PSME
Upper
PICO
Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	100 %
Height	Tree 0m	Tree 10m
Tree Size Class	Sapling >4.5ft; <5"DBH	

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

Some sites exhibit resprouting shrubs (physocarpus malvaceus) as the dominant lifeform. Other sites may be dominated by pine grass (calamagrostis rubescens).

Description

Openings of grass and forbs that are created by infrequent, stand replacement fire. Seedlings and saplings of ponderosa pine, western larch, Douglas-fir and lodgepole pine may be present; grand fir would be rare in the early succession stage. On the moist end of the BpS's range, western larch will be dominant; on the drier end ponderosa pine will be dominant. Following very severe replacement fires, this class may be dominated by lodgepole pine on the moist end of the BpS's range.

**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.

Additional dominant species (low in the canopy) will include ninebark (PHMA5; Physocarpus malvaceus) and ceanothus (CESA; Ceanothus sanguineus). Spiraea may also be present. Elk sedge and pine grass are also present.

After 30yrs, this class succeeds to C (mid-development open) unless a replacement or mixed severity fire occurs.

Class B **15 %**

Mid Development 1 Closed

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model

Indicator Species and Canopy Position

PIPO
Upper
PSME
Upper
PICO
Middle
LAOC
Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	61 %	80 %
Height	Tree 10.1m	Tree 25m
Tree Size Class	Medium 9-21"DBH	

☐ Upper layer lifeform differs from dominant lifeform.

Description

Pole and medium sized Douglas-fir and ponderosa pine. Larch regeneration will decrease due to shade intolerance. Grand fir as a minor component will remain or increase due to shade tolerance.

Replacement fire will return this class to A. Mixed fire can open the stand and convert this class to class C (mid-development open). Surface fires are rare, but would maintain the class. Pathogens can create gaps and cause a transition to class C (mid-development open).

Class C **30 %**

Mid Development 1 Open

Upper Layer Lifeform

- ☐ Herbaceous
- ☐ Shrub
- ☑ Tree

Fuel Model

Indicator Species and Canopy Position

PIPO
Upper
PSME
Upper
LAOC
Upper
PICO
Middle

Structure Data (for upper layer lifeform)

	Min	Max
Cover	0 %	60 %
Height	Tree 10.1m	Tree 25m
Tree Size Class	Medium 9-21"DBH	

☐ Upper layer lifeform differs from dominant lifeform.

Description

Pole and medium sized ponderosa pine or Douglas-fir are the dominant trees. Western larch may also be present on the moist end of the BpS's range.

Additional dominant species (low in the canopy) will include ninebark (PHMA5; Physocarpus malvaceus) and ceanothus (CESA; Ceanothus sanguineus). Spiraea may also be present in the shrub layer. Elk sedge and pinegrass are also major components of the understory.

Replacement fire, though rare, will cause a transition to class A (early development). Surface fires, mixed fires and insects will maintain the open condition. If this class escapes fire for 35yrs, it will succeed to class B (mid-development closed). If fires do occur, it will succeed at 115yrs to class D (late-development open).

**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.

Class D **35 %**

Late Development 1 Open

Upper Layer Lifeform

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

Fuel Model

Indicator Species and Canopy Position

PIPO
Upper
PSME
Upper
LAOC
Upper

Lower

Structure Data (for upper layer lifeform)

	Min	Max
Cover	21 %	60 %
Height	Tree 25.1m	Tree 50m
Tree Size Class	Very Large >33"DBH	

- [ ] Upper layer lifeform differs from dominant lifeform.

Description

Large and very large sized ponderosa pine and Douglas-fir are the dominant trees. Western larch (on the moist end of the BpS's range) and grand fir may also be present in small proportions. Structure may be patchy depending on fire severities in previous class. Ceanothus will be decreasing and willow, spiraea, ninebark, elk sedge and pine grass will still be present.

Replacement fire, though rare, will cause a transition to class A (early development). Surface fires, mixed fires and insects will maintain the open condition. If this class escapes fire for 35yrs, it will succeed to class E (late-development closed).

Class E **10 %**

Late Development 1 Closed

Upper Layer Lifeform

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

Fuel Model

Indicator Species and Canopy Position

PIPO
Upper
PSME
Upper
ABGR
Middle
LAOC
Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	61 %	80 %
Height	Tree 25.1m	Tree 50m
Tree Size Class	Very Large >33"DBH	

- [ ] Upper layer lifeform differs from dominant lifeform.

Description

Large and very large diameter ponderosa pine, Douglas-fir, grand fir and western larch (on the moist end of the BpS's range). Ninebark and spiraea will be present, but ceanothus will be absent. Some pinegrass and elk sedge will be present.

Replacement fire will return this class to A. Mixed fire can open the stand and convert this class to class D (late-development open). Surface fires are rare, but would maintain the class. Pathogens can create gaps and cause a transition to class D (mid-development open).

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:** I

Historical Fire Size (acres)

Avg 1000
Min 100
Max 30000

Sources of Fire Regime Data

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

Fire Intervals

	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement	300	167	500	0.00333	7
Mixed	60	40	75	0.01667	34
Surface	35	25	85	0.02857	59
All Fires	21			0.04857	

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

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

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