10530

Northern Rocky Mountain Ponderosa Pine Woodland and Savanna

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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Vegetation Type

Forest and Woodland

Map Zones

10, 19

Geographic Range

Throughout the northern and central Rocky Mountains in Montana, central Idaho, and northeastern Washington. In Idaho, the distribution of this Biophysical Setting (BpS) is limited to lower slope positions in the Boise, Payette, and Salmon river drainages. In northeastern Washington, it is found on sites <4,500ft, particularly along the Columbia and Kettle rivers and in the Okanogan Highlands.

Biophysical Site Description

These stands typically occurred on hot, dry, south-, and west-facing slopes at lower elevations with well-drained soils and gentle to moderately steep slopes.

Vegetation Description

Frequent fires promoted a grass-dominated understory with sparse shrubs and a ponderosa pine overstory. Douglas-fir and Rocky Mountain juniper may occur as incidental individuals, but overall Douglas-fir cover will be <10%.

Common snowberry, antelope bitterbrush, and chokecherry are important shrubs, and mountain mahogany may also occur on rocky outcrops. Grasses may include Idaho and rough fescue (Fischer and Bradley 1987).

Fischer and Bradley (1987), Fischer and Clayton (1983), and Smith and Fischer (1997) would characterize this BpS as predominantly Fire Groups 2 and 4 for western Montana and central Idaho, Fire Group 3 for eastern Montana and Wyoming, and Fire Group 1 for northern Idaho. Also refer to Crane and Fischer (1986).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIPO | *Pinus ponderosa* | Ponderosa pine |
| FEID | *Festuca idahoensis* | Idaho fescue |
| PSSP6 | *Pseudoroegneria spicata* | Bluebunch wheatgrass |
| PUTR2 | *Purshia tridentata* | Antelope bitterbrush |

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

Frequent, non-lethal surface fires were the dominant disturbance factor, occurring every 3-30yrs (Arno and Petersen 1993; Arno 1976; Fischer and Bradley 1987). Three-year fire return intervals (FRIs) are likely very localized and associated with Native American burning. However, there is some disagreement as to the extent of Native burning. On most sites, mean fire return intervals (MFRIs) were likely ~15yrs.

Mixed-severity fires likely occurred about every 50yrs, again depending on the vegetative state. Mixed-severity fires were more common on relatively moist, steep slopes (Arno 1980). Barrett (1998) reported low- and mixed-severity fires with an MFRI of 20yrs (range 10-62) in a Douglas-fir/mallow-ninebark habitat type at a study site near Bigfork, Montana.

Stand-replacement fires likely occurred in stands and small patches on the order of a few hundred acres every 300-700yrs depending on the vegetative state. Some authors note that little information is available regarding the exact nature of stand-replacement fire severity in this BpS.

Western pine beetle may attack large ponderosa pine in any canopy density.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 347 | 4 | 50 | 1000 |
| Moderate (Mixed) | 55 | 23 | 16 | 100 |
| Low (Surface) | 17 | 73 | 12 | 20 |
| All Fires | 12 | 100 |  |  |

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

For ponderosa pine forests that mostly burned at low severities patches of young, mid- and old ages, classes were typically small (<0.4ha), creating an uneven-aged landscape (Agee 1998). Patches were the result of death of old trees, bark beetles, and fire that killed young conifers. Open, late-seral stands typically dominated the landscape with frequent fire, though even-aged stands were uncommon. In ID, this type was often found as a narrow band between grassland/ shrublands at lower elevations and Douglas-fir types at higher elevations.

Adjacency or Identification Concerns

Vegetation is characterized both by Pfister et al. (1977) and by Steele et al. (1981) as the ponderosa pine series and by Williams et al. (1995) as Douglas-fir-ponderosa pine.

These sites typically formed the lower timberline in the area and were historically found adjacent to grasslands and shrublands that dominated valley bottoms. The early-seral stages often resemble adjacent shrubland or grassland BpS.

In the 21st century, after missing several FRIs, these stands may support an overabundance of ponderosa pine pole thickets, heavy duff and litter layers, and few grasses or shrubs. As a result, it may be difficult to distinguish this BpS in its mid- and late-seral stages from Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest (BpS 1045).

Dense pockets of Douglas-fir may also occur. This BpS may be found on several different habitat types depending on the local fire regime; frequent fires, typical of Fire Regime I, maintained these stands as ponderosa pine, but today they may have been successionally replaced by Douglas-fir in some areas.

This vegetation type continues to be commercially logged. Site modifications include plantations and terracing.

Issues or Problems

1) Fischer and Bradley (1987) show only a single pathway from the dense pole stage characterized by succession without a fire disturbance (Class A to Class B). However, it seems that under a frequent fire regime, these stands would typically bypass Class B and move directly to Class C -- unless there is not enough fuel to carry fire at this stage (stand density and leaf litter buildup are insufficient for fire spread). 2) Mixed-severity and stand-replacement FRIs are not well documented in the literature for this BpS. Some evidence suggests these fires indeed occurred, but there may be room to improve the assumptions used in this modeling effort. Kaufmann et al. (2005) found that mixed-severity fires were more common at the northern and eastern end of the ponderosa pine forest distribution in the Northern Rocky Mountains.

The southern portion of map zone (MZ) 10 may have supported a more frequent fire regime and thus more of Class D. The BpS was not split for MZ10.

Native Uncharacteristic Conditions

Cover >60% can be considered uncharacteristic in this woodland community.

Comments

Janet Fryer made descriptive changes to this model during the 2016 BpS Review.

Additional LANDFIRE National reviewers were Steve Barrett (sbarrett@mtdig.net), Susan Miller (smiller03@fs.fed.us), Lyn Morelan (lmorelan@fs.fed.us), Catherine Phillips (cgphillips@fs.fed.us), and Cathy Stewart (cstewart@fs.fed.us). Peer review resulted in additions to the description.

Succession Classes

**Mapping Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Upper Layer Lifeform** | **Height (m)** | **Canopy Cover (%)** | | | | | | | | | |
| **0-10** | **11-20** | **21-30** | **31-40** | **41 - 50** | **51-60** | **61-70** | **71-80** | **81-90** | **91-100** |
| Herb | 0-0.5 | A | A | A | A | A | A | A | A | A | A |
| Herb | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Herb | >1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0-0.5 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 1.0-3.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | >3.0 | A | A | A | A | A | A | A | A | A | A |
| Tree | 0-5 | A | A | A | A | A | A | UN | UN | UN | UN |
| Tree | 5-10 | C | C | C | C | B | B | UN | UN | UN | UN |
| Tree | 10-25 | C | C | C | C | B | B | UN | UN | UN | UN |
| Tree | 25-50 | D | D | D | D | E | E | UN | UN | UN | UN |
| Tree | >50 | D | D | D | D | E | E | UN | UN | UN | UN |

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

**Description**

Class A 6 Early Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| FEID | Festuca idahoensis | Idaho fescue | Lower |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |

Description

Fire-maintained grass/forb and/or seedlings and saplings. Grass species are the dominant lifeform attaining maximum heights of 3ft and patchy in distribution (25-75% cover). Seedling/ sapling size class would be <5in in diameter. There would be no large patches (10-100ac) of large or old-growth trees due to poor site conditions and abundance of rock outcroppings. However, dispersed large-diameter fire-remnant ponderosa pines and snag trees could be present. These large-diameter trees would have a density of less than one tree per acre.

*Maximum Tree Size Class*  
Sapling >4.5ft; <5" DBH

Class B 6 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| FEID | Festuca idahoensis | Idaho fescue | Lower |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |
| PSME | Pseudotsuga menziesii | Douglas-fir | Mid-Upper |

Description

Closed ponderosa pine, pole- and medium-diameter stand; may have Douglas-fir as incidentals. Larger, old-growth trees may be present in this class, though the pole- and medium-diameter class (5-21in) occurring between these large trees is most abundant and characteristic of this class. May see large-diameter snags, dead and down trees present. High-density stunted pole stands are counted here; may see insect/disease here.

*Maximum Tree Size Class*  
Medium 9-21" DBH

Class C 20 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| FEID | Festuca idahoensis | Idaho fescue | Lower |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |
| PSME | Pseudotsuga menziesii | Douglas-fir | Mid-Upper |

Description

Open ponderosa pine, pole and medium stand that may have Douglas-fir as incidentals. Larger, old-growth trees may be present in this class; the pole- and medium-diameter (5-21in) trees are characteristic for this class. These patches have probably had recent fire or are drier, so they retain a more open condition.

*Maximum Tree Size Class*  
Medium 9-21" DBH

Class D 57 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| FEID | Festuca idahoensis | Idaho fescue | Lower |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |
| PSME | Pseudotsuga menziesii | Douglas-fir | Mid-Upper |

Description

Fire-maintained open, park-like ponderosa pine; nearly any fire maintains; Douglas-fir may be seen as incidentals or in patches but not a major component of the overstory. The overstory is characterized by large and very large ponderosa pine and isolated, large Douglas-fir. Understory is dominated by grasses and is relatively open. Conifer seedlings are very infrequent, with <10% cover and usually occurring in patches.

*Maximum Tree Size Class*  
Very Large >33" DBH

Class E 11 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | All |
| PSME | Pseudotsuga menziesii | Douglas-fir | All |

Description

High-density, multi-storied ponderosa pine stand; Douglas-fir regeneration on some sites. Thickets of various size classes distributed within the class and may be interspersed with large snags.

*Maximum Tree Size Class*  
Very Large >33" DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:OPN | 0 | Mid1:OPN | 29 |
| Mid1:OPN | 30 | Late1:OPN | 104 |
| Mid1:CLS | 30 | Late1:CLS | 164 |
| Late1:OPN | 105 | Late1:OPN | 979 |
| Late1:CLS | 165 | Late1:CLS | 999 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |
| Alternative Succession | Early1:OPN | Mid1:CLS | 1 | 1 | Yes | 25 |
| Mixed Fire | Early1:OPN | Early1:OPN | 0.016 | 63 | No | 0 |
| Replacement Fire | Early1:OPN | Early1:OPN | 0.02 | 50 | Yes | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 25 |
| Replacement Fire | Mid1:OPN | Early1:OPN | 0.002 | 500 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.016 | 63 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.05 | 20 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:OPN | 0.003 | 333 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.06 | 17 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 25 |
| Replacement Fire | Late1:OPN | Early1:OPN | 0.001 | 1000 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Insects or Disease | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.085 | 12 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:OPN | 0.005 | 200 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:OPN | 0.02 | 50 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.04 | 25 | Yes | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.04 | 25 | Yes | 0 |

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