10470

Northern Rocky Mountain Mesic Montane Mixed-Conifer Forest

BpS Model/Description Version: Aug. 2020

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

Forest and Woodland

Map Zones

8, 9

Geographic Range

This type is modal in map zone (MZ) 10. It also occurs on stream and river canyons in the foothills of the Blues and of the northern Rockies. If this type occurs in MZ08, it would occur in the foothills of Yakima and Klickitat counties, especially on stream slopes.

Biophysical Site Description

This type occurs above the 25-in precipitation zone in the Blue Mountains and on a wide range of elevation. Soils are commonly deep ash (2-3ft) with high moisture content.

Vegetation Description

Includes ABGR, ABCO, and PSME, with various amounts of LAOC, PIPO, CADE3, PIEN, TABR, and PICO. ABCO hybridizes with ABGR throughout the Blue Mountains. Important understory associates are ASCA3, CLUN, LIBO2, VAME, ACGL, and TRCA3.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ABGR | *Abies grandis* | Grand fir |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| PIPO | *Pinus ponderosa* | Ponderosa pine |
| LAOC | *Larix occidentalis* | Western larch |

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

Disturbance Description

Fire regime is mixed. Average fire return intervals range from approximately 45yrs at the warm, dry end of this biophysical setting (BpS) to approximately 100yrs at the transition to ABLA2 or TSME in the Wallowas and ABLA2 in the Blue Mountains. Insect and disease interactions are important in the mid and late closed conditions. Important insects and diseases include fir engraver, Douglas-fir beetle, Armillaria and other root diseases, stem decay caused by Indian paint fungus, and defoliating insects (western spruce budworm, Douglas-fir tussock moth, and larch casebearer). Root diseases occur in smaller patches (<100ha) and attack all age classes, whereas bark beetles cause mid-size patches (<1,000ha), especially older trees. Defoliators can cause patches in the same size range as replacement fire, primarily affecting younger trees.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 204 | 35 |  |  |
| Moderate (Mixed) | 155 | 45 |  |  |
| Low (Surface) | 355 | 20 |  |  |
| All Fires | 71 | 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

Stand-replacement fire occurs in large events covering 1000- to 10,000-ac patches.

Adjacency or Identification Concerns

This BpS occurs below subalpine fir and above dry mixed conifer (pine dominated) in the Blue Mountains. Management in the 1960s and ʼ70s planted more ponderosa pines than were originally present. These pines are now showing extensive snow and ice damage. There was likely more larch in the past than currently occurs, due either to high grading or to preferential removal for domestic uses. Also, blister rust has removed much of the white pine.

Issues or Problems

This mixed-conifer type occurs on the cool moist sites, whereas Northern Rocky Mountain Dry-Mesic Montane Mixed-Conifer Forest (1045) occurs on warm, dry sites.

Native Uncharacteristic Conditions

Comments

MZs 8 and 9 were combined during 2015 BpS Review.

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 | A | A | A | A |
| Tree | 5-10 | C | C | C | C | C | B | B | B | B | B |
| Tree | 10-25 | C | C | C | C | C | B | B | B | B | B |
| Tree | 25-50 | D | D | D | D | D | E | E | E | E | E |
| Tree | >50 | D | D | D | D | D | E | E | E | E | E |

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 13 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CEVE | Ceanothus velutinus | Snowbrush ceanothus | Upper |
| ACGL | Acer glabrum | Rocky Mountain maple | Upper |
| SASC | Salix scouleriana | Scouler’s willow | Upper |
| PHMA5 | Physocarpus malvaceus | Mallow ninebark | Upper |

Description

Shrub communities usually dominate following stand-replacement disturbance. Important species vary by ecoregion. ACGL, CEVE, and PHMA are important in the Blue Mountains. Some sites are limited, or shrub dominated (due to a reburn), and succeed to Class C. These shrub fields (CEVE, SASC) may recycle in Class A for extended periods of time.

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

Class B 41 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| ABGR | Abies grandis | Grand fir | Upper |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| LAOC | Larix occidentalis | Western larch | Upper |

Description

This class includes pole-size to small (5-20in) trees. These sites have prolific reproduction and close quickly. Class B is dominated by various mixtures of shade-tolerant and -intolerant conifers. Species vary by ecoregion. PSME and/or ABGR have higher cover than LAOC, PIPO, PIMO, or PICO.

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

Class C 12 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| LAOC | Larix occidentalis | Western larch | Upper |
| PSME | Pseudotsuga menziesii | Douglas-fir | Mid-Upper |
| ABGR | Abies grandis | Grand fir | Mid-Upper |

Description

Small amounts of this BpS do not immediately close or are created by disturbance events. Class C is pole-size to small (5-20in) trees; shade-intolerant species are dominant. PIPO and LAOC are more important components than PSME and ABGR or ABCO in this class.

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

Class D 11 Late Development 1 - Open

Upper Layer Lifeform: Tree

Upper Layer Canopy Cover: 0-50%

Upper Layer Canopy Height: Tree 25.1-50.1m+

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| LAOC | Larix occidentalis | Western larch | Upper |
| ABGR | Abies grandis | Grand fir | Mid-Upper |

Description

Size of this class is large (>20in in DBH), but canopy closure is low and sites may be single- or multi-canopied. PSME, PIPO, and LAOC are more important than ABGR or ABCO in this class. Insect/disease, including bark beetles, attack the older trees. There is occasional wind/snow damage that maintains this class.

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

Class E 23 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ABGR | Abies grandis | Grand fir | Upper |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| LAOC | Larix occidentalis | Western larch | Upper |

Description

Large trees dominate Class E. Stands typically have multiple canopies. Species composition may be mixed shade-tolerant species or include minor amounts of shade-intolerant pines or larch. Insects, including bark beetles, usually remove the older trees.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 29 |
| Mid1:OPN | 30 | Late1:OPN | 79 |
| Mid1:CLS | 30 | Late1:CLS | 99 |
| Late1:OPN | 80 | Late1:OPN | 999 |
| Late1:CLS | 100 | Late1:CLS | 998 |

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** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Competition or Maintenance | Early1:ALL | Early1:ALL | 0.0033 | 303 | Yes | 0 |
| Alternative Succession | Early1:ALL | Mid1:OPN | 0.007 | 143 | Yes | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 40 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.015 | 67 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.02 | 50 | No | 0 |
| Wind or Weather or Stress | Mid1:CLS | Mid1:OPN | 0.001 | 1000 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.002 | 500 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 40 |
| Wind or Weather or Stress | Late1:OPN | Late1:OPN | 0.003 | 333 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.005 | 200 | No | 0 |
| Insects or Disease | Late1:OPN | Mid1:OPN | 0.008 | 125 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.002 | 500 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Mid1:OPN | 0.003 | 333 | Yes | 0 |
| Insects or Disease | Late1:CLS | Mid1:OPN | 0.007 | 143 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.007 | 143 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.009 | 111 | Yes | 0 |

References

Burleson, W. 1981 (unpublished report) North Slope Fire Frequency -- Western Ochoco Mountains.

Camp, A., C. Oliver, P. Hessburg and R. Everett. Predicting late-successional fire refugia pre-dating European settlement in the Wenatchee Mountains. For. Ecol. Manage. 95: 63-77.

Hessburg, P.F., R.G. Mitchell, and G.M. Filip. 1994. Historical and Current Roles of Insects and Pathogens in Eastern Oregon and Washington Forested Landscapes. PNW-GTR-327. Portland, OR, USDA Forest Service, Pacific Northwest Research Station, 72 pp.

Hessl A.E., D. McKenzie and R. Schellhaus. 2004. Drought and pacific decadal oscillation linked to fire occurrence in the inland Pacific Northwest. Ecological Applications, 14(2): 425-442.

Hummel, S. and J.K. Agee. 2003. Western spruce budworm defoliation effects on forest structure and potential fire behavior. Northwest Science. 77(2): 159-169.

Johnson, C.G. and R.R. Clausnitzer. 1992. Plant associations of the Blue and Ochoco Mountains. P6-ERW-TP-036-92. Portland, OR: USDA Forest Service, Pacific Northwest Region. 164 pp. + appendices.

Johnson, C.G. and S.A. Simon. 1986. Plant associations of the Wallowa-Snake province. R6-ECOL-TP-255b-86. Portland, OR: USDA Forest Service, Pacific Northwest Region. 272 pp. + appendices.

Lehmkuhl, J.F., P.F Hessburg, R.L. Evertt, M.H. Huff and R.D. Ottmar. 1994. Historical and Current Forest Landscapes of Eastern Oregon and Washington. Part 1: Vegetation Pattern and Insect and Disease Hazards, PNW-GTR-328. Portland, OR, USDA Forest Service, Pacific Northwest Research Station, 88 pp.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

Simon, S.A. 1991. Fire history in the Jefferson Wilderness Area east of the Cascade Crest. Final report to the Deschutes National Forest Fire Staff. 29 pp.

Volland, L. 1982. Plant Associations of the Central Oregon Pumice Zone. R6-ECOL-104-1982

Volland, L. Ecology Plot Data Unpublished Data Collected Mid 1960's to Mid 1970's

Wickman, B.E., R.R. Mason and T.W. Swetnam 1994. Searching for long-term patterns of forest insect outbreaks. Pages 251-261 in: S.R. Leather, K.F.A. Walters, N.J. Mills and A.D. Watt, eds., Individuals, Populations and Patterns in Ecology, Intercept Press, Andover, United Kingdom.

Wright, C.S. and J.K. Agee. 2004. Fire and vegetation history in the eastern cascade mountains, Washington. Ecological Applications, 14(2): 443-459.