10470

Northern Rocky Mountain Mesic Montane Mixed-Conifer Forest

BpS Model/Description Version: Aug. 2020

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

Forest and Woodland

Map Zones

10, 19

Model Splits or Lumps

This biophysical setting (BpS) is split into multiple models. Nearly pure cedar groves, with much longer fire return intervals (FRIs), have been split from this system into BpS 10472.

Geographic Range

This BpS occupies maritime-influenced sites in north-central to northern Idaho, northeastern Washington, and northwestern Montana 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 varies widely geographically, but today is 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 ridgetops), 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 <5% of the relative canopy cover in the Idaho Panhandle National Forest (Art Zack, unpubl. data). Historically, white pine may have occupied >30% of the relative canopy cover, and western larch may have occupied >10% (Art Zack, pers. comm.). On potassium-limited soils, white pine was historically dominant (>60%). The removal of white pine and western larch is due to non-native blister rust, logging, and fire suppression (see also “Adjacency or Identification Concerns”).

This system represents some of the most productive forests in this region. Forests are typically even-aged, with scattered residuals (i.e., 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 red-cedar, and western hemlock habitat types (Pfister et al. 1977). Daubenmire and Daubenmire (1968) characterized upland red-cedar associates as a “*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*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIMO3 | *Pinus monticola* | Western white pine |
| LAOC | *Larix occidentalis* | Western larch |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| ABGR | *Abies grandis* | Grand fir |
| THPL | *Thuja plicata* | Western red-cedar |
| TSHE | *Tsuga heterophylla* | Western hemlock |

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

Disturbance Description

Fire regime group III or IV. Fires are mostly mixed severity (frequency, 50-150yrs), with the wetter sites experiencing longer FRIs and greater severity fires (frequency, ~200yrs) (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 of 200yrs and total fire intervals of 65yrs for these systems.

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

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 185 | 43 | 150 | 500 |
| Moderate (Mixed) | 139 | 57 |  |  |
| Low (Surface) |  |  |  |  |
| All Fires | 79 | 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

Scales of fires tended to be highly variable and extensive (tens of thousands of acres) (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.

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 mean FRI (MFRI).

Vegetation composition has changed significantly from historical conditions. White pine is almost nonexistent 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 toe-slopes.

Issues or Problems

Native Uncharacteristic Conditions

Comments

In June 2020 TNC changed the code for this BpS from 10471 to 10470.

Map zones 10 and 19 were combined during 2015 BpS Review.

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

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 | C | B | B | B | B |
| Tree | 10-25 | C | C | C | C | C | C | B | B | B | B |
| Tree | 25-50 | D | D | D | D | D | D | E | E | E | E |
| Tree | >50 | D | D | D | D | D | D | 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 |
| SASC | Salix scouleriana | Scouler’s willow | Upper |
| PIMO3 | Pinus monticola | Western white pine | Middle |
| LAOC | Larix occidentalis | Western larch | Upper |

Description

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).

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

Class B 35 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIMO3 | Pinus monticola | Western white pine | Upper |
| LAOC | Larix occidentalis | Western larch | Upper |
| ABGR | Abies grandis | Grand fir | Upper |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |

Description

Pole- and medium-size trees of mixed conifer species have overtopped the shrubs and dominate the site. Canopy cover is dense. 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 seral species on cooler sites (Williams et al. 1995).

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

Class C 5 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIMO3 | Pinus monticola | Western white pine | Upper |
| LAOC | Larix occidentalis | Western larch | Upper |
| THPL | Thuja plicata | Western red cedar | Low-Mid |
| ABGR | Abies grandis | Grand fir | Upper |

Description

Open canopy conditions may be a result of topoedaphic conditions or disturbances. Open, patchy stand conditions that favor western larch and white pine. Seedling/sapling western red cedar and western hemlock will be present in the understory.

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

Class D 9 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIMO3 | Pinus monticola | Western white pine | Upper |
| LAOC | Larix occidentalis | Western larch | Upper |
| THPL | Thuja plicata | Western red cedar | Upper |
| ABGR | Abies grandis | Grand fir | Upper |

Description

Open canopy conditions are rare and may be a result of topo-edaphic conditions or disturbances. Western red-cedar and western hemlock will be co-dominant with western white pine, western larch, and grand fir. Seedling/sapling western red-cedar and grand fir will be present in the understory.

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

Class E 38 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| THPL | Thuja plicata | Western red-cedar | Upper |
| TSHE | Tsuga heterophylla | Western hemlock | Upper |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| ABGR | Abies grandis | Grand fir | Upper |

Description

Late-development closed conditions are multi-story, dense canopies. Understories will tend to be depauperate due to dense overstory. Large woody debris is abundant and is caused by in-stand competition. Root rot will affect Douglas-fir and grand fir in patches.

*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 | 19 |
| Mid1:OPN | 20 | Mid1:CLS | 44 |
| Mid1:CLS | 20 | Late1:CLS | 79 |
| Late1:OPN | 80 | Late1:CLS | 109 |
| Late1:CLS | 80 | 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** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Insects or Disease | Mid1:OPN | Early1:ALL | 0.0003 | 3333 | Yes | 0 |
| Insects or Disease | Mid1:OPN | Mid1:OPN | 0.0027 | 370 | No | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.005 | 200 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.006 | 167 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.001 | 1000 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Early1:ALL | 0.001 | 1000 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.004 | 250 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.006 | 167 | Yes | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Mixed Fire | Late1:OPN | Mid1:OPN | 0.005 | 200 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Early1:ALL | 0.002 | 500 | Yes | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.0025 | 400 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:CLS | 0.006 | 167 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.006 | 167 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.007 | 143 | Yes | 0 |

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