**10453**

Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest - Grand Fir

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
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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. 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.

Geographic Range

This BpS occurs mostly in Idaho, eastern Washington, eastern Oregon, and western Montana. It is very important in Bailey's section M332.

Biophysical Site Description

Occurs above 4,500ft elevation, just below the spruce-fir zone. Soils are underlain by granitics, metamorphics, and minor volcanic rocks. Most have a volcanic-ash-influenced loess surface layer. This type is most likely to occur in draws and riparian areas that are less likely to experience fire and therefore allow for the development of grand fir.

Vegetation Description

Stands range from relatively open to densely stocked and are usually dominated by a mix of early- to mid-seral species, including lodgepole pine and western larch, with lesser amounts of grand fir, Engelmann spruce, and ponderosa pine. Grand fir increases markedly during mid- to late successional stages, in the absence of fire and in response to pathogens that affect other species, like bark beetles. Stand understories range from moderately open to dense and include beargrass, mountain huckleberry, grouse whortleberry, serviceberry, and snowberry.

Sources on historic composition are derived from Losensky (1993) and Sub-basin Assessments from the 1930s (USDA 1997-2003).

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PICO | *Pinus contorta* | Lodgepole pine |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| LAOC | *Larix occidentalis* | Western larch |
| ABGR | *Abies grandis* | Grand fir |

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

Disturbance Description

This BpS tends to occur in fire refugia and burns less frequently than the other Dry-Mesic Montane Mixed Conifer subtypes (Larch-BpS 10452 and Ponderosa Pine-Douglas-fir-BpS 10451). When fires do occur, they tend to burn with high and mixed severity.

Root disease and mountain pine beetle are very active in this BpS.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 218 | 32 | 50 | 250 |
| Moderate (Mixed) | 104 | 68 | 35 | 150 |
| Low (Surface) |  |  |  |  |
| All Fires | 70 | 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

Terrain is usually rolling hills, convex ridges, and mountain slopes with little dissection, so fires spread easily. Large infrequent fires result in large patch sizes, of 100s-1,000s of acres, and some occurrence of 10,000s of acres.

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 system was thus split into three BpSs to represent differences in species dominance and fire regimes. BpS 10451 represents the drier sites and is dominated by ponderosa pine and Douglas-fir with a very frequent, low-severity fire regime. BpS 10452 is dominated by western larch and represents slightly more mesic sites. The fire regime is dominated by moderately frequent, mixed-severity fires. BpS 10453 is dominated by grand fir and represents more mesic, cool sites with longer mixed-severity fire regimes.

This BpS represents the warm/moderately moist grand fir habitat types (Pfister et al. 1977), including ABGR/VAGL, ABGR/ASCA and ABGR/XETE. This BpS grades into larch-dominated sites at lower elevations (BpS 10452) and western spruce-fir forest at higher elevations. This BpS typically supports more lodgepole pine than the adjacent (lower-elevation) larch mixed-conifer type.

Issues or Problems

Proportion of seral structural stages may fluctuate widely over time because large stand-replacing fires can affect 100,000ac at a time.

Native Uncharacteristic Conditions

Comments

Kerry Kemp and Cathy Stewart reviewed this model in 2015. The age at which mid-seral classes transition to late was adjusted to allow more time for mid-seral stands to reach the late stage and achieve the size class associated with late development.

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 | B | B | B | B | B | B |
| Tree | 10-25 | D | D | D | D | E | E | E | E | E | E |
| Tree | 25-50 | D | D | D | D | E | E | E | E | E | E |
| Tree | >50 | D | D | D | D | E | 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 14 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| XETE | Xerophyllum tenax | Common beargrass | Lower |
| VAME | Vaccinium membranaceum | Thinleaf huckleberry | Lower |
| PICO | Pinus contorta | Lodgepole pine | Low-Mid |
| PSME | Pseudotsuga menziesii | Douglas-fir | Low-Mid |

Description

Post stand-replacing fire. This class is initially dominated by resprouting forbs and shrubs and transitions to seedling- and sapling-dominated. Grand fir is a common early-seral dominant with Douglas-fir after fire (0–15yrs post-fire; Kemp 2016) Larch, lodgepole, and ponderosa pine may also be present. Residual, large western larch often survive all but the most severe fire to serve as seed sources.

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

Class B 17 Mid Development 1 - Closed

Indicator Species

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

Description

Pole and immature forest (or mature lodgepole). Lodgepole pine is the most common dominant. Douglas-fir and western larch are secondary dominants. Larch may be reduced by grand fir competition, in the absence of fire.

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

Class C 32 Mid Development 1 - Open

Indicator Species

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

Description

Pole and immature forest (or mature lodgepole) usually created by mixed fire, root disease activity, or mountain pine beetle activity in mixed conifer stands.

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

Class D 17 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| LAOC | Larix occidentalis | Western larch | Upper |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PICO | Pinus contorta | Lodgepole pine | Upper |

Description

Mature forest. These are usually the result of mixed-severity fire, leaving an overstory of larch, Douglas fir, with some residual grand fir or ponderosa pine and lodgepole. They may also occur as a result of insect or pathogen activity removing a Douglas fir, lodgepole, or grand fir understory.

*Maximum Tree Size Class*  
Large 21-33" DBH

Class E 20 Late Development 1 - Closed

Indicator Species

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

Description

Mature forest. These are usually the result of uninterrupted succession in areas of low root disease occurrence, fire refugia, or in areas of larch dominance.

*Maximum Tree Size Class*  
Large 21-33" DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 29 |
| Mid1:OPN | 30 | Late1:CLS | 124 |
| Mid1:CLS | 30 | Late1:CLS | 124 |
| Late1:OPN | 125 | Late1:CLS | 165 |
| Late1:CLS | 125 | 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 | 0.0045 | 222 | Yes | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.0045 | 222 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.008 | 125 | No | 0 |
| Insects or Disease | Mid1:OPN | Mid1:OPN | 0.01 | 100 | No | 0 |
| Wind or Weather or Stress | Mid1:CLS | Mid1:OPN | 0.001 | 1000 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.0045 | 222 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.007 | 143 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.008 | 125 | Yes | 0 |
| Insects or Disease | Late1:OPN | Mid1:OPN | 0.0025 | 400 | Yes | 0 |
| Wind or Weather or Stress | Late1:OPN | Late1:OPN | 0.003 | 333 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0045 | 222 | Yes | 0 |
| Insects or Disease | Late1:OPN | Late1:OPN | 0.005 | 200 | No | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.015 | 67 | No | 0 |
| Insects or Disease | Late1:CLS | Mid1:OPN | 0.0025 | 400 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Mid1:OPN | 0.003 | 333 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0045 | 222 | Yes | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.015 | 67 | Yes | 0 |

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