10450

Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest

BpS Model/Description Version: Aug. 2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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Vegetation Type

Forest and Woodland

Map Zones

21

Geographic Range

Northern Rocky Mountains in western, north and central MT, eastern WA and northern ID, extending south to the Great Basin. In MZ20 tree islands throughout the zone.

Modelers and reviewers for MZ21 feel strongly that this BpS is not in MZ21, and that the Douglas-fir stands in MZ21 are BpS 1166. The only place this might occur is near Livingston and at lower elevations in the very northern portion of the zone. Ponderosa pine, western larch and grand fir are not thought to occur in MZ21 in this form. There is no naturally occurring ponderosa pine/Douglas-fir types in the forested area from Bozeman to west Yellowstone. There is some ponderosa pine south of Big Timber and more to the east once you leave MZ21. There is also none in Yellowstone or the Island Park area. There is no *Abies grandis* or *Larix* in this area either.

Biophysical Site Description

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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. In MZ20, elevations can range from 2500ft to up to 6900ft in Bear Paw Mountains. Sites can range from nearly flat to steep on all aspects.

This can also occur along benches with *Linnea Borealis*.

Common habitat types include: PSME/CARU - all phases, PSME/PHMA, PSME/SYAL, ABGR/LIBO and ABGR/XETE. In MZ20, not necessarily ABGR. Other common habitat types are also: PSME/ARUV and PSME/COCA-LIBO in Bear Paw Mountains. In the Snowy Mountains, PIEN/LIBO is found.

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 becomes more abundant throughout the northern range of the BpS.

In MZ20, Douglas-fir co-dominates in the canopy and dominates stand understories; PICO can be present in the understory of open stands. At lower elevations in the Snowy Range, hybrids can occur of Englemann and white spruce. Western larch and grand fir are absent.

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

In MZ20, snowberry (SYAL) and *Mahonia repens* (MARE11) are also present in the shrub layer.

Most of the indicator species for 1045 do not occur in the NW part of the Greater Yellowstone Ecosystem and thus MZ21.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIPO | *Pinus ponderosa* | Ponderosa pine |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| PICO | *Pinus contorta* | Lodgepole pine |
| CARU | *Calamagrostis rubescens* | Pinegrass |
| CAGE | *Carex geophila* | White mountain sedge |
| PHMA5 | *Physocarpus malvaceus* | Mallow ninebark |
| SYAL | *Symphoricarpos albus* | Common snowberry |
| MARE11 | *Mahonia repens* | Creeping barberry |

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

Disturbance Description

Consists of Fire Regime Groups I, II, III and IV with surface and mixed severity fires at varying intervals. Replacement fires may also occur. Mixed severity fire increases and surface fires decrease further north and higher elevations.

Lodgepole pine can dominate the understories in open canopy stands with the influence of low severity surface fires.

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. Windthrow disturbance can also affect stands of this type.

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.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 75 | 50 |  |  |
| Moderate (Mixed) | 106 | 36 |  |  |
| Low (Surface) | 266 | 14 |  |  |
| All Fires | 38 | 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

Patch sizes were probably highly variable. Surface and mixed severity fires may have been variable in size, and potentially achieve large sizes due to wind influence (10s-1000s 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.

At lower elevations or southerly aspects, this type generally borders dry ponderosa pine, shrub or grassland systems. At higher elevations or northerly aspects, it borders 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, PSME/SYAL and PSME/LIBO).

Because of fire suppression, xeric ponderosa pine types may be 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 units.

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Issues or 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).

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Native Uncharacteristic Conditions

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

Comments

Additional reviewers for MZ21 included Eric Miller, Mark Novak, Liz Davy and one anonymous reviewer.

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 | UN | UN |
| Tree | 10-25 | C | C | D | D | D | D | E | E | UN | UN |
| Tree | 25-50 | C | C | D | D | D | D | E | E | UN | UN |
| Tree | >50 | C | C | D | D | D | D | E | E | 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 31 Early Development 1 - All Structures

Indicator Species

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

Description

Openings of grass and forbs that are created by infrequent, stand replacement fire. Seedlings and saplings of ponderosa pine, Douglas-fir and lodgepole pine may be present; on the drier end ponderosa pine will be dominant. Following very severe replacement fires, this class may be dominated by lodgepole pine. Some sites exhibit resprouting shrubs (*Physocarpus malvaceus*) as the dominant lifeform. Other sites may be dominated by pine grass (*Calamagrostis rubescens*).

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, tussock grass, Idaho fescue and pine grass are also present.

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

Class B 22 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PSME | Pseudotsuga menziesii | Douglas-fir | Upper |
| PICO | Pinus contorta | Lodgepole pine | Middle |

Description

Pole and medium sized Douglas-fir and ponderosa pine.

*Maximum Tree Size Class*  
Pole 5-9" DBH

Class C 29 Mid Development 1 - Open

Indicator Species

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

Description

Pole and medium sized ponderosa pine or Douglas-fir are the dominant trees.

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.

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

Class D 13 Late Development 1 - Open

Indicator Species

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

Description

Large and very large sized ponderosa pine and Douglas-fir are the dominant trees. 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.

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

Class E 5 Late Development 1 - Closed

Indicator Species

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

Description

Large and very large diameter ponderosa pine and Douglas-fir. Ninebark and spiraea will be present, but ceanothus will be absent. Some pinegrass and elk sedge will be present.

*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:OPN | 39 |
| Mid1:OPN | 40 | Late1:OPN | 114 |
| Mid1:CLS | 40 | Late1:CLS | 149 |
| Late1:OPN | 115 | Late1:OPN | 999 |
| Late1:CLS | 150 | 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** |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.008 | 125 | No | 0 |
| Alternative Succession | Early1:ALL | Mid1:CLS | 0.01 | 100 | Yes | 0 |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.019 | 53 | Yes | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 60 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.0053 | 189 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.0106 | 94 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.011 | 91 | No | 0 |
| Insects or Disease | Mid1:OPN | Mid1:OPN | 0.0125 | 80 | No | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.011 | 91 | Yes | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.013 | 77 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.02 | 50 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 60 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.005 | 200 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0053 | 189 | Yes | 0 |
| Insects or Disease | Late1:OPN | Late1:OPN | 0.01 | 100 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.016 | 63 | No | 0 |
| Surface Fire | Late1:CLS | Late1:OPN | 0.0007 | 1429 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.0027 | 370 | No | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.011 | 91 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.013 | 77 | Yes | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:OPN | 0.015 | 67 | Yes | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.02 | 50 | Yes | 0 |

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