10454

Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest - Lodgepole Pine

BpS Model/Description Version: Aug. 2020

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

Forest and Woodland

Map Zones

20

Model Splits or Lumps

This BpS is split into multiple models:

This represents areas where LP is well represented. This BpS split is found on well-drained, thin soils, generally on relatively cool settings. See biophysical site description for elevational differences.

Geographic Range

Northern Rocky Mountains in western, north and central MT.

This BpS is split into two models for the island mountain ranges of MZ20 (Moccasins, Judiths, Bear Paws, Little Rockies, Sweetgrass Hills and Snowies). This split for lodgepole pine describes areas where PICO is well represented. The other split is for where ponderosa pine occurs.

Biophysical Site Description

In the island ranges, this BpS split is found on well-drained, thin soils, generally on relatively cool settings.

Elevation ranges from 4,500-9,000ft. On the southerly aspects, it ranges from 6,500-9,000ft. (9,000ft in the Snowies). On the northerly aspects, it ranges from 4,500-6,500ft.

Vegetation Description

Lodgepole pine is present and well represented. Douglas-fir co-dominates or dominates the canopy and dominates the understory on all but the higher elevation northerly aspects. At higher elevations or on northerly aspects, spruce and subalpine fir are a minor component. (larch and grand fir is NOT present - they occurs west of Continental Divide)

Understory shrubs are dominated by common juniper, Oregon-grape, kinnikinic, snowberry, white spiraea, ninebark and whortleberry. Other shrubs include Rocky Mountain maple and paper birch. On the cool sites of this split, especially in the Little Rockies, paper birch and aspen will pioneer alongside conifers. Common chokecherry is absent or poorly represented in stands dominated by PICO of this BpS. Common forbs and graminoids include heartleaf arnica, twinflower, elk sedge and pinegrass.

Common habitat types include: PSME/SYAL/CARU, PSME/JUCO, PSME/PHMA (although for PSME/PHMA, PICO and PIPO are rarely present east of the divide - it's mostly DF cover), and PSME/LIBO/CARU, PSME/LIBO/VAGL. PSME/CARU/CARU with Pial possible. In the Bear Paw Mountains: PSME/COCA-LIBO. In the Snowy Mts: PICEA/LIBO. This BpS split corresponds to Fire Group Seven: cool habitat types usually dominated by lodgepole pine (including some of above and PSME/COCA-VAMY and PICO/LIBO.)

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PICO | *Pinus contorta* | Lodgepole pine |
| PSME | *Pseudotsuga menziesii* | Douglas-fir |
| JUCO | *Juncus compressus* | Roundfruit rush |
| SYAL | *Symphoricarpos albus* | Common snowberry |
| ARUV | *Arctostaphylos uva-ursi* | Kinnikinnick |
| CARU | *Calamagrostis rubescens* | Pinegrass |
| CAGE | *Carex geophila* | White mountain sedge |

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

Disturbance Description

Consists of Fire Regime Groups III, IV and V, with mixed severity and replacement fires occurring at varying intervals, but generally less than 100-150yrs. Stand replacement fires are more common where lodgepole pine is a significant component, and these stands become more likely to burn after 60-80yrs.

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 events can be extensive and affect stands of this type in all but early stage structure.

Western gall rust is the dominant disease on lodgepole and ponderosa pine and increases in occurrence with lack of fire.

Root rot and mistletoe are minor concerns in the northern extent of this BpS.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 144 | 52 |  |  |
| Moderate (Mixed) | 274 | 28 |  |  |
| Low (Surface) | 384 | 20 |  |  |
| All Fires | 76 | 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 because of topography and associated differences in vegetation. Mixed severity fires may have been highly variable in size. Stand replacement fires could (and do) potentially achieve large sizes due to wind influence (100s to 1,000s of acres).

Adjacency or Identification Concerns

The mixed conifer zone east of the Continental Divide is broad, and represents a moisture and temperature gradient that affects fire regimes and species dominance. This BpS split addresses areas dominated by lodgepole pine.

At lower elevations or on southerly aspects, this BpS split (LP) borders the other split (PP). At higher elevations or northerly aspects, it includes spruce and subalpine fir in the Snowies and the Sweetgrass Hills. In the other island ranges, spruce and fir are a minor component.

It may be difficult to distinguish between this BpS split and 1050 (Rocky Mountain Lodgepole Pine Forest), but this BpS split for the island ranges of MZ20 does not have many true lodgepole pine series habitat types and can be instead identified by virtue of presence of co-dominant Douglas-fir. BpS 1166 seems to fit the island ranges of central MT; however, BpS 1166 not considered to occur in MZ20, but rather 1045.

Issues or Problems

Determining mapping attributes may be difficult given the rough similarity of some succession class stages to those in other PICO dominated BpSs, especially along lower elevation ecotones between the montane and subalpine zones.

Native Uncharacteristic Conditions

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

Comments

Originally, the MZ20 model was created by Steve Cooper, Lee Clark, Dan Rasmussen, Jim Roessler and Shannon Downey Iverson and was adapted from model for 1910451. Changes to description and species were made as well as significant changes to model and fire intervals. Model was initially unsplit for MZ20. However, review of the model led to splitting the system between lodgepole and ponderosa pine. New modelers for the split effort are listed in modeler section, as well as Steve Cooper. Original modelers were contacted to receive input on new split model.

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

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PICO | Pinus contorta | Lodgepole pine | Upper |

Description

Openings of grass and forbs are created by infrequent, stand replacement fire. Seedlings and saplings are dominated by PICO. Some sites exhibit resprouting shrubs like snowberry as the dominant lifeform. Other sites may be dominated by graminoids such as pine grass (*Calamagrostis rubescens*).

Resprouting shrubs such as snowberry, Oregon-grape, ninebark and whortleberry are dominant in the understory. Dominant forbs and grasses may include arnica, pinegrass and elk sedge.

*Maximum Tree Size Class*  
Seedling <4.5ft

Class B 47 Mid Development 1 - Closed

Indicator Species

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

Description

Sapling to pole sized lodgepole pine. The understory is usually depauperate.

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

Class C 17 Mid Development 1 - Open

Indicator Species

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

Description

This is a disturbance-caused mid-development open canopy stage.

It is thought that the open classes (C and D) might comprise approximately 10-15% of the landscape each.

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

Class D 6 Late Development 1 - Open

Indicator Species

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

Description

It is thought that the open classes (C and D) might comprise approximately 10-15% of the landscape each.

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

Class E 16 Late Development 1 - Closed

Indicator Species

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

Description

This system will be small diameter lodgepole pine dominated in a closed canopy condition. The lodgepole pine component is becoming decadent and breaking up with Douglas-fir as a major understory component and minor ponderosa pine coming in as another understory component on warm sites.

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

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 20 |
| Mid1:OPN | 21 | Late1:OPN | 90 |
| Mid1:CLS | 21 | Late1:CLS | 90 |
| Late1:OPN | 91 | Late1:OPN | 999 |
| Late1:CLS | 91 | 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 | 0.001 | 1000 | Yes | 0 |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.001 | 1000 | No | 0 |
| Insects or Disease | Early1:ALL | Early1:ALL | 0.001 | 1000 | No | 0 |
| Wind or Weather or Stress | Early1:ALL | Early1:ALL | 0.002 | 500 | No | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 60 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Wind or Weather or Stress | Mid1:OPN | Mid1:OPN | 0.01 | 100 | No | 0 |
| Insects or Disease | Mid1:OPN | Mid1:OPN | 0.01 | 100 | No | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.02 | 50 | No | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.005 | 200 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Wind or Weather or Stress | Mid1:CLS | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 60 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.001 | 1000 | No | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.001 | 1000 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.005 | 200 | Yes | 0 |
| Wind or Weather or Stress | Late1:OPN | Late1:OPN | 0.02 | 50 | No | 0 |
| Insects or Disease | Late1:OPN | Late1:OPN | 0.02 | 50 | No | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.001 | 1000 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.001 | 1000 | No | 0 |
| Wind or Weather or Stress | Late1:CLS | Late1:OPN | 0.02 | 50 | Yes | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.02 | 50 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.02 | 50 | Yes | 0 |

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