10540

Southern Rocky Mountain Ponderosa Pine Woodland

BpS Model/Description Version: Aug. 2020

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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|  |  |  |  |

Vegetation Type

Forest and Woodland

Map Zone

33

Geographic Range

This is the dominant forest type along the eastern slope of the continental divide but is scarce on the western side of the divide. The montane zone borders the Plains grasslands to the east and in the foothills of the eastern slope includes shrublands and meadows.

For map zones (MZs) 27 and 33 northern version, this would be above ECOMAP subsections M331Ii, which will include Black Forest and subsections 331Ig and 331Ih (Cleland et al. 2007).

Biophysical Site Description

The montane zone (1,650-2,900m/4,900-8,700ft). Lower montane <2,120m and upper montane >2,120m. Northern Front Range ponderosa pine tends to be associated with xeric, south-facing slopes, and Douglas-fir tends to be associated with mesic, north-facing slopes. South of I-70, the southern Front Range southward to Pikes Peak, ponderosa-pine/Douglas-fir forest exists on all site conditions (i.e., aspect) >1,970m (6,500ft) elevation, and pure ponderosa pine exists <1,970m (6,500ft). Below 1,970m (6,500ft) in the southern Front Range is similar to the lower montane of the northern Front Range. Differences exist in the upper montane stands between the northern and southern Front Range.

For MZs 27 and 33 north, this occurs as woodlands on north exposures or steep slopes greater than ~25% slope.

Vegetation Description

The lower montane zone is dominated by ponderosa pine (historically <30% canopy cover 2,000m [6,600ft]), more dense stands of Douglas-fir on north-facing slopes. In the upper montane zone, the ponderosa pine cover type occurs both as relatively pure stands and with significant components of Douglas-fir. In the northern Front Range, there is typically a striking contrast in stand density and species composition on south- as opposed to north-facing slopes. Douglas-fir is prominent on north-facing slopes. Structural stages will greatly vary depending on past disturbance history (i.e., 50% cover of Class B would not be outside of the historical range of variability following widespread high-severity fire that has occurred in the past over the last few hundred years prior to the 20th century). In the southern Front Range, historically most Douglas-fir was confined to north-facing slopes with occasional larger Douglas-fir on other aspects.

South of Denver along the Front Range, gambel oak is a component, and as you move into northern New Mexico, it may be a major understory species. It is unsure how much white fir mixes in generally south of Colorado Springs into New Mexico.

BpS Dominant and Indicator Species

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

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

Disturbance Description

Mixed-severity fire regime – typical average fire frequency ranges from 40-100yrs (5-100ha) (Kaufmann et al. 2000; Veblen et al. 2000; Ehle and Baker 2003; Sherriff 2004). These fires range from low-severity to high-severity fires, and the forest structure was shaped by the pattern of fire at a landscape scale. Drought and other weather events (e.g., blowdown); insects such as mountain pine beetle, Douglas-fir beetle, and western spruce budworm (Swetnam and Lynch 1993); and pathogens such as dwarf mistletoe (Hawksworth 1961) also play important roles in this type.

Replacement fire rotation is uncertain, and this affects the amount of forest in each class.

There is considerable debate over the role of mixed-severity and surface fires in the historical range of variability in this and other ponderosa pine forests in the northern and central Rockies (Baker and Ehle 2001, 2003; Barrett 2004; Veblen et al. 2000).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 504 | 5 |  |  |
| Moderate (Mixed) | 157 | 15 |  |  |
| Low (Surface) | 30 | 80 |  |  |
| All Fires | 24 | 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

Northern range -- fire history sites range from 1-200ha, average of 100ha areas for fire regime information over 10s of 1,000s of acres. Southern range -- patch sizes from <1ha to a landscape scale of 35km2 plus.

Adjacency or Identification Concerns

Please also see Adj/ID concerns for BpS MZs 27 and 33 10541 -- south.

Adjacent BpSs would be pinyon juniper on south-facing slopes south of Denver, mixed conifer/lodgepole in northern areas, and mountain shrubs on south- and east-facing slopes.

Juniper might have invaded currently into ponderosa pine south of Denver due to less fire. There is also loss of old growth, a loss of open stages, increased Douglas-fir, and increased density of small-diameter ponderosa pine.

Cheatgrass is an exotic today.

Issues or Problems

Replacement fire rotation is uncertain, and this affects the amount of forest in each class.

Native Uncharacteristic Conditions

Tree density is increased. Douglas-fir, juniper, and possibly white fir and gambel oak have invaded.

Comments

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 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Herb | 0.5-1.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Herb | >1.0 | UN | UN | UN | UN | UN | UN | UN | UN | UN | UN |
| Shrub | 0-0.5 | A | A | A | A | A | A | UN | UN | UN | UN |
| Shrub | 0.5-1.0 | A | A | A | A | A | A | UN | UN | UN | UN |
| Shrub | 1.0-3.0 | A | A | A | A | A | A | UN | UN | UN | UN |
| Shrub | >3.0 | A | A | A | A | A | A | UN | UN | UN | UN |
| Tree | 0-5 | C | C | C | C | C | B | B | B | B | B |
| Tree | 5-10 | C | C | C | C | C | B | B | B | B | B |
| Tree | 10-25 | D | D | D | D | D | E | E | E | E | E |
| 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 9 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CERCO | Cercocarpus | Mountain mahogany | Low-Mid |
| PIPO | Pinus ponderosa | Ponderosa pine | All |
| PSME | Pseudotsuga menziesii | Douglas-fir | All |
| BOGR2 | Bouteloua gracilis | Blue grama | Lower |

Description

Openings with up to 10% by overstory dominated by ponderosa pine and sometimes Douglas-fir. Some openings may persist.

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

Class B 9 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 |
| CERCO | Cercocarpus | Mountain mahogany | None |

Description

Closed, mid seral stands. Cover can vary: >50% canopy cover in the northern Front Range (above ~6,500ft) and >30% canopy cover in the southern Front Range.

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

Class C 23 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 |
| CERCO | Cercocarpus | Mountain mahogany | Low-Mid |

Description

Open, mid seral stands. Cover can vary: <50% canopy cover in the northern Front Range (above ~6,500ft) and <30% canopy cover in the southern Front Range.

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

Class D 41 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 |
| CERCO | Cercocarpus | Mountain mahogany | Lower |

Description

Open, mature stands. Cover can vary: <50% canopy cover in the northern Front Range (above ~6,500ft) and <30% canopy cover in the southern Front Range.

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

Class E 18 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 |
| CERCO | Cercocarpus | Mountain mahogany | Lower |

Description

Closed, mature stands. Cover can vary: >50% canopy cover in the northern Front Range (above ~6,500ft) and >30% canopy cover in the southern Front Range.

*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 | 49 |
| Mid1:OPN | 50 | Late1:OPN | 199 |
| Mid1:CLS | 50 | Late1:CLS | 199 |
| Late1:OPN | 200 | Late1:OPN | 999 |
| Late1:CLS | 200 | 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 | 0.0063 | 159 | No | 0 |
| Alternative Succession | Early1:ALL | Mid1:CLS | 0.01 | 100 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.0333 | 30 | No | 0 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.0022 | 455 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.0031 | 323 | No | 0 |
| Mixed Fire | Mid1:OPN | Early1:ALL | 0.0031 | 323 | Yes | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.04 | 25 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.0022 | 455 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.0063 | 159 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.0333 | 30 | No | 0 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0022 | 455 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 0.003 | 333 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.0063 | 159 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.04 | 25 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0022 | 455 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.0063 | 159 | Yes | 0 |
| Surface Fire | Late1:CLS | Late1:CLS | 0.0063 | 159 | No | 0 |

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