10540

Southern Rocky Mountain Ponderosa Pine Woodland

BpS Model/Description Version: Aug. 2020

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

Forest and Woodland

Map Zones

16, 23, 24

Geographic Range

This type is found throughout map zones (MZs) 16, 23, and 24.

Biophysical Site Description

These woodlands occur at the lower treeline/ecotone between grassland or shrubland and more mesic coniferous forests typically in warm, dry, exposed sites. Elevations range from <500m to 2,800m in the mountains of New Mexico. Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops are most common. This ecological system generally occurs on igneous, metamorphic and sedimentary material, with characteristic features of good aeration and drainage, coarse textures, circumneutral to slightly acid pH, an abundance of mineral material, rockiness, and periods of drought during the growing season.

Vegetation Description

*Pinus ponderosa* is the predominant conifer; *Pseudotsuga menziesii*, *Pinus edulis*, *Pinus monophyla*, and *Juniperus* spp. may be present in the tree canopy. The understory is usually shrubby, with *Artemisia nova*, *Artemisia tridentata*, *Arctostaphylos patula*, *Arctostaphylos uva-ursi*, *Cercocarpus montanus*, *Cercocarpus ledifolius*, *Purshia stansburiana*, *Purshia tridentata*, *Quercus gambelii*, *Symphoricarpos oreophilus*, *Prunus virginiana*, *Amelanchier alnifolia*, and *Rosa* spp. *Pseudoroegneria spicata* and species of *Hesperostipa*, *Achnatherum*, *Festuca*, *Muhlenbergia*, and *Bouteloua* are some of the common grasses. *Pinus ponderosa*/*Arctostaphylos patula* represents the extreme with typically a high percentage of rock and bare soil present.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIPO | *Pinus ponderosa* | Ponderosa pine |
| PSEUD7 | *Pseudotsuga* | Douglas-fir |
| QUGA | *Quercus gambelii* | Gambel oak |
| SYOR | *Symphoricarpos orbiculatus* | Coralberry |
| ARPA6 | *Arctostaphylos patula* | Greenleaf manzanita |
| ABCO | *Abies concolor* | White fir |
| RONE | *Robinia neomexicana* | New Mexican locust |

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

Disturbance Description

These sites are in a Fire Regime Group I. Surface fire intervals ranged from 10-50yrs, and replacement severity occurred at intervals of 150-400yrs+ (Brown 2000; Crane 1986; Bradley 1992a; Bradley 1992b; Barrett 1988; Morgan et al. 1996; Brown 1994). Topography (aspect, substrate depth, slope, position, etc.) may have exerted strong control over fire behavior, producing spatially and temporally mixed-severity regimes (Stanley Kitchen, USFS, personal communication). However, there are multiple citations asserting this may not be the case, including Grissino-Mayer et al. (2004), Swetnam and Baisan (1996), and Touchan et al. (1996).

Bark beetle outbreaks are highly related to stand density. Denser stands in relation to site capacity will favor outbreaks, which will decrease as trees are thinned.

Additional citations in references, plus see Ecological Restoration Institute for fire history reconstructions (<https://nau.edu/eri/>).

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 282 | 6 | 150 | 400 |
| Moderate (Mixed) | 228 | 8 |  |  |
| Low (Surface) | 20 | 86 | 10 | 50 |
| All Fires | 17 | 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

Adjacency or Identification Concerns

This system intergrades with Rocky Mountain Ponderosa Pine Savanna (1117). They are distinguished by Rocky Mountain Ponderosa Pine Savanna's higher-frequency surface-fire regime, less steep or rocky environmental setting, and more open grassy understory structure.

This ecological system is often transitional between non-forested areas or between *Pinus ponderosa* (at lower elevations) and Douglas-fir/white fir//lodgepole pine at higher elevations. It is usually found on sites that are dry montane with a variety of slopes, aspects, and soil conditions. If a large component of aspen is present, Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland (1061) should be used.

Issues or Problems

Under dry site conditions, oak and chaparral vegetation will prevent stand closure from Class C to B or from D to E.

Native Uncharacteristic Conditions

Comments

Some uncertainty exists in the historical fire return intervals and the percent of fires that were replacement fires for this BpS (e.g., Williams and Baker 2012; Fule et al. 2014).

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 | C | C | C | C | B | B | B | B | B | B |
| 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 12 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| QUGA | Quercus gambelii | Gambel oak | Upper |
| SYOR | Symphoricarpos orbiculatus | Coralberry | Upper |
| ARPA6 | Arctostaphylos patula | Greenleaf manzanita | Upper |

Description

Openings with grass, shrub, and forbs created after replacement fire. May have seedlings of ponderosa pine or other species (e.g., Douglas-fir/white fir).

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

Class B 5 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PSEUD7 | Pseudotsuga | Douglas-fir | Mid-Upper |
| QUGA | Quercus gambelii | Gambel oak | Mid-Upper |
| ARPA6 | Arctostaphylos patula | Greenleaf manzanita | Mid-Upper |

Description

Forest canopy closure is 35% or greater. Closed pole-sapling/grass and shrubs. Shrub cover can be dense.

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

Class C 10 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PSEUD7 | Pseudotsuga | Douglas-fir | Mid-Upper |
| QUGA | Quercus gambelii | Gambel oak | Low-Mid |
| ARPA6 | Arctostaphylos patula | Greenleaf manzanita | Low-Mid |

Description

Forest canopy closure is 15-35%. Open pole-sapling/grass and shrubs.

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

Class D 68 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PSEUD7 | Pseudotsuga | Douglas-fir | Upper |
| QUGA | Quercus gambelii | Gambel oak | Low-Mid |
| ARPA6 | Arctostaphylos patula | Greenleaf manzanita | Low-Mid |

Description

Forest canopy closure is 15-35%. Open large trees/grass and shrubs. Ponderosa eventually outnumbers Douglas-fir/white fir due to insect/disease and difference in fire resistance.

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

Class E 5 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PSEUD7 | Pseudotsuga | Douglas-fir | Upper |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| ABCO | Abies concolor | White fir | Upper |
| SYOR | Symphoricarpos orbiculatus | Coralberry | None |

Description

Forest canopy closure is 35% or greater. Closed, large trees, poles, saplings, and shrubs.

*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 | 99 |
| Mid1:CLS | 40 | Late1:CLS | 99 |
| Late1:OPN | 100 | Late1:OPN | 999 |
| Late1:CLS | 100 | 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 | 0.01 | 100 | Yes | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 25 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.0025 | 400 | Yes | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.1667 | 6 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.0067 | 149 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.04 | 25 | No | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.04 | 25 | No | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | No | 50 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0025 | 400 | Yes | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.05 | 20 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0025 | 400 | Yes | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.02 | 50 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.05 | 20 | Yes | 0 |

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