10540

Southern Rocky Mountain Ponderosa Pine Woodland

BpS Model/Description Version: Aug. 2020

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| **Modelers** |  | **Reviewers** |  |
| Julia H. Richardson | jhrichardson@fs.fed.us | Louis Provencher | lprovencher@tnc.org |
| None | None | None | None |
| None | None | None | None |

Vegetation Type

Forest and Woodland

Map Zone

17

Geographic Range

Biophysical Setting (BpS) is found on a few ranges in the Great Basin and Mojave Desert and southern Utah High Plateau.

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 in British Columbia to 2,800m in the New Mexico mountains. 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 soils derived from 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; *Pinus monophylla*, *Pinus edulis*, 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* (eastern map zones 12 and 17), *Symphoricarpos oreophilus*, *Prunus virginiana*, *Amelanchier alnifolia*, and *Rosa* spp. Common grass species include *Pseudoroegneria spicata* and species of *Hesperostipa*, *Achnatherum*, *Festuca*, and *Muhlenbergia*. *Pinus ponderosa*/*Arctostaphylos patula* represents the extreme with a typically high percentage of rock and bare soil present.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIPO | *Pinus ponderosa* | Ponderosa pine |
| ARTR2 | *Artemisia tridentata* | Big sagebrush |
| SYOR | *Symphoricarpos orbiculatus* | Coralberry |
| ARPA6 | *Arctostaphylos patula* | Greenleaf manzanita |
| QUGA | *Quercus gambelii* | Gambel oak |
| PSSP6 | *Pseudoroegneria spicata* | Bluebunch wheatgrass |

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

Disturbance Description

These sites are in a high-frequency, low- and mixed-severity fire regime group. Some portions of these sites are transition zones to high-frequency, high-severity and moderate-frequency, low- and mixed-severity fire regime groups. Frequent surface and mixed-severity fires were the common fire regime characteristics (Bradley 1992), with mixed severity being predominant due to the presence of shrubs with a mean fire return interval of <35yrs. Surface fire intervals ranged from 10-50yrs, and replacement severity occurred at intervals of 150-400+yrs (Brown 2000; Crane 1986; Bradley 1992a; Bradley 1992b; Barrett 1988; Morgan et al 1996; Brown 1994). Stand-replacement fires were generally restricted to the closed canopy forest and the stand initiation conditions. Topography (aspect, substrate depth, slope, position, etc.) exerted strong control over fire behavior, producing spatially and temporally mixed-severity regimes (Stanley Kitchen, USFS, personal communication).

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.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 256 | 6 | 150 | 400 |
| Moderate (Mixed) | 38 | 39 |  |  |
| Low (Surface) | 28 | 55 | 10 | 50 |
| All Fires | 15 | 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

BpS is found throughout the Great Basin, although it is not common. Patch size is mostly 10-100ac with 1,000ac less common.

Adjacency or Identification Concerns

This system intergrades with Rocky Mountain Ponderosa Pine Savanna (1117). It is distinguished by the high-frequency, surface-fire regime, less steep or rocky environmental setting, and more open grassy understory structure of the savanna system.

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, model BpS 1061 should be used.

Issues or Problems

Ponderosa pine woodlands and savannas should be better researched for the Great Basin. Many scattered PIPO patches in the Great Basin were completely logged during the mining era of 1850-1900 (e.g., several 100ac in the Clover Mountains on the Great Basin-Mojave Desert boundary in eastern Nevada) and during the railroad construction era throughout the western United States. It is also thought that the dominance of shrubs in understories is greater today than during pre-settlement because livestock grazing greatly reduced grasses in the southern portion of the Great Basin. Therefore, shrubby woodlands today may have been grassy savannas in the past.

Native Uncharacteristic Conditions

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 | 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 | D | D | D | D | D | D |
| 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** |
| 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., white fir).

*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 |
| PIMO | Pinus monophyla | Singleleaf pinyon | Mid-Upper |
| JUOS | Juniperus osteosperma | Utah juniper | Mid-Upper |
| ABCO | Abies concolor | White fir | Mid-Upper |

Description

Closed pole-sapling/grass and shrubs. Shrub cover can be dense.

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

Class C 18 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| ABCO | Abies concolor | White fir | Upper |
| ARPA6 | Arctostaphylos patula | Greenleaf manzanita | Low-Mid |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |

Description

Open pole-sapling/grass and shrubs. Ponderosa pine dominates with white fir present.

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

Class D 58 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| ABCO | Abies concolor | White fir | Upper |
| ARPA6 | Arctostaphylos patula | Greenleaf manzanita | Low-Mid |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |

Description

Open large trees/grass and shrubs. Ponderosa eventually outnumbers white fir due to insect/disease and difference in fire resistance.

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

Class E 1 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PIMO | Pinus monophylla | Singleleaf pinyon | Mid-Upper |
| ABCO | Abies concolor | White fir | Upper |
| JUOS | Juniperus osteosperma | Utah juniper | Low-Mid |

Description

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 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.028 | 36 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.04 | 25 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.0067 | 149 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.04 | 25 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.04 | 25 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 50 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0025 | 400 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.028 | 36 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.05 | 20 | No | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.0067 | 149 | 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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