11170

Southern Rocky Mountain Ponderosa Pine Savanna

BpS Model/Description Version: Aug. 2020

Update: 3/18

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| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
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| None | None | None | None |
| None | None | None | None |

Vegetation Type

Steppe/Savanna

Map Zones

20

Geographic Range

Ponderosa pine is widely distributed throughout North America occupying about 38 million acres across 14 states. Ponderosa pine savanna is much more restricted than the ponderosa pine woodlands. Ponderosa pine savanna is typically found throughout the inland west of North America in the foothills and montane zones, generally in the grassland/forest ecotone. Elevation range from 335m in British Columbia to 2,700m in the southwest.

This Biophysical Setting (BpS) is thought to be limited to moderate in extent in map zone (MZ) 20. Presettlement amount was appreciable, but current data does not reflect that.

Biophysical Site Description

This type occurs primarily on rolling plains, plateaus and dry slopes in the foothills and montane zones; it is usually found on southerly aspects and drier sites.

Vegetation Description

This system is best described as a savanna that has widely spaced *Pinus ponderosa* or open and park-like stands dominated by *Pinus ponderosa*. Understory vegetation in the true savanna occurrences is predominantly fire-resistant grasses and forbs that resprout following surface fires; shrubs, understory trees and downed logs are uncommon.

Important species include grasses such as *Agropyron* spp, *Festuca*, spp, *Pseudoroegneria spicata, Andropogon gerardii, Schizachyrium scoparium,* and *Bouteloua gracilis*.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| PIPO | *Pinus ponderosa* | Ponderosa pine |
| FEID | *Festuca idahoensis* | Idaho fescue |
| PSSP6 | *Pseudoroegneria spicata* | Bluebunch wheatgrass |
| AGROP2 | *Agropyron* | Wheatgrass |
| SCSC | *Schizachyrium scoparium* | Little bluestem |

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

Disturbance Description

Under presettlement conditions, interior ponderosa pine forests were subject to frequent, low severity fires (Bradley et al. 1992). Mean fire return interval (FRI) for this type generally averaged between 10-25yrs (Barrett 2004). Mean FRI for low-severity fires is approximately 10-25yrs, with shorter intervals in more open stands. The mean FRI for mixed severity fires averaged between 50yrs (closed stands) to 80yrs (open stands). Replacement fire is rare, but more frequent in closed stands, averaging between 250yrs, versus open stands, averaging FRI of 800yrs.

Mountain pine beetle is the most significant insect impacting this system. Mountain pine beetle outbreaks increase with stand density with return interval of 100yrs on average. Closed stands above 40% cover are attacked by pine beetle, resulting in older trees being selectively killed and sometimes younger trees too.

Dwarf mistletoe is also an important disturbance in stands without fire or a secondary result of insect attacks.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 386 | 4 | 150 | 800 |
| Moderate (Mixed) | 74 | 18 | 50 | 80 |
| Low (Surface) | 17 | 78 | 10 | 25 |
| All Fires | 14 | 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

Ponderosa pine savannas are naturally limited in size in the Interior West. Although large fires have been noted in ponderosa pine in the past, these are thought to occur in ponderosa pine woodlands, not the smaller savannas.

Adjacency or Identification Concerns

Found adjacent to BpS 1141 Northwestern Great Plains Mixedgrass Prairie and lower montane forest types such as BpS 1045 Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest.

This type may be easily confused with BpS 1054 Southern Rocky Mountain Ponderosa Pine Woodland, especially when fire-suppressed. Check the biophysical site description boxes so as not to misclassify this BpS with other similar types. Distinguishing between the savanna and woodland ecotypes can be difficult, especially in areas heavily impacted by fire exclusion and grazing, which have promoted substantial tree encroachment in these BpS types and adjacent grasslands.

In MZ20, presettlement amount was appreciable, but current data does not reflect that (Cooper, personal communication).

A century of anthropogenic disturbance such as livestock grazing and fire suppression has resulted in a higher density of Pinus ponderosa trees, altering the fire regime and species composition. Presently, many stands contain understories of more shade-tolerant species, such as *Pseudotsuga menziesii*, as well as younger cohorts of *Pinus ponderosa*.

Many scattered PIPO patches in the Great Basin were completely logged during the mining era of 1850-1900 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 presettlement because livestock grazing greatly reduced grasses. Therefore, shrubby woodlands today may have been grassy savannas in the past.

Issues or Problems

Ponderosa pine savanna should be better researched.

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 | A | A | A | A | A | A | A | A | A | A |
| Tree | 5-10 | C | C | C | B | B | B | B | B | B | B |
| Tree | 10-25 | D | D | D | E | E | E | E | E | E | E |
| Tree | 25-50 | D | D | D | E | E | E | E | E | E | E |
| Tree | >50 | D | D | D | E | 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 1 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| FEID | Festuca idahoensis | Idaho fescue | Lower |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |

Description

Graminoid dominated community following stand replacement fire. Grass would be short to medium in height, and range in canopy cover from 0-100%. Sprouting shrubs on more moist site can occur. Conifer seedlings are scattered throughout, but are typically found in dog-hair type thickets. DBH. range of 0-2in.

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

Class B 10 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| FEID | Festuca idahoensis | Idaho fescue | Lower |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |

Description

Sapling to pole size pine. Understory species decreasing to depressed. DBH. range of 2-14in.

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

Class C 19 Mid Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| FEID | Festuca idahoensis | Idaho fescue | Lower |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |

Description

Pole to saw timber size trees with diverse understory of grasses and forb species. Open structure maintained by low intensity and mixed severity fire. DBH range of 2-14in.

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

Class D 67 Late Development 1 - Open

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| FEID | Festuca idahoensis | Idaho fescue | Lower |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |

Description

Scattered saw timber size trees throughout, creating a savanna-like appearance with diverse grass and forb species dominating the understory. DBH range of 14in+.

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

Class E 3 Late Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| PIPO | Pinus ponderosa | Ponderosa pine | Upper |
| PSEUD7 | Pseudotsuga | Douglas-fir | Upper |
| FEID | Festuca idahoensis | Idaho fescue | Lower |
| PSSP6 | Pseudoroegneria spicata | Bluebunch wheatgrass | Lower |

Description

Decadent trees. Severely suppressed to poorly developed understory. Douglas-fir may be present. DBH range of 14in+.

*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:CLS | 14 |
| Mid1:OPN | 15 | Late1:OPN | 99 |
| Mid1:CLS | 15 | 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 | 0.0667 | 15 | Yes | 0 |
| Alternative Succession | Early1:ALL | Mid1:OPN | 0.1 | 10 | Yes | 0 |
| Alternative Succession | Mid1:OPN | Mid1:CLS | 1 | 1 | Yes | 25 |
| Replacement Fire | Mid1:OPN | Early1:ALL | 0.0013 | 769 | Yes | 0 |
| Mixed Fire | Mid1:OPN | Mid1:OPN | 0.0125 | 80 | No | 0 |
| Surface Fire | Mid1:OPN | Mid1:OPN | 0.0667 | 15 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Insects or Disease | Mid1:CLS | Mid1:OPN | 0.01 | 100 | Yes | 0 |
| Mixed Fire | Mid1:CLS | Mid1:OPN | 0.02 | 50 | Yes | 0 |
| Alternative Succession | Late1:OPN | Late1:CLS | 1 | 1 | Yes | 50 |
| Replacement Fire | Late1:OPN | Early1:ALL | 0.0013 | 769 | Yes | 0 |
| Mixed Fire | Late1:OPN | Late1:OPN | 0.0125 | 80 | No | 0 |
| Surface Fire | Late1:OPN | Late1:OPN | 0.0667 | 15 | No | 0 |
| Insects or Disease | Late1:CLS | Late1:OPN | 0.0025 | 400 | Yes | 0 |
| Replacement Fire | Late1:CLS | Early1:ALL | 0.004 | 250 | Yes | 0 |
| Insects or Disease | Late1:CLS | Mid1:OPN | 0.0075 | 133 | Yes | 0 |
| Mixed Fire | Late1:CLS | Late1:OPN | 0.02 | 50 | Yes | 0 |

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