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Southern Rocky Mountain Ponderosa Pine Woodland

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Forest and Woodland

Map Zone

22

Geographic Range

This system is found throughout the northern and central Rocky Mountains in Montana, central Idaho, and north-central Wyoming. In map zone [MZ] 22 in Wyoming, it is found along west slope of Big Horn Mountains at elevations between 4,500-8,000ft, in subsections M331Ba.

Biophysical Site Description

These stands typically occurred on hot, dry south- and west-facing slopes at lower elevations with well-drained soils and gentle to moderately steep slopes.

Vegetation Description

Frequent fires promoted a grass-dominated understory with sparse shrubs and a ponderosa pine overstory. Douglas-fir and Rocky Mountain juniper may occur as incidental individuals, but overall Douglas-fir cover will be <10%. In Wyoming, Utah juniper may occur as incidentals but should not comprise more than 10% of the landscape.

Common snowberry, antelope bitterbrush, and chokecherry are important shrubs, and mountain mahogany may also occur on rocky outcrops. Grasses may include Idaho and rough fescue (Fischer and Bradley 1987). More mesic shrubs may be present if it is a wetter habitat type.

In the Bighorn Mountains of Wyoming, understory herbaceous vegetation includes Idaho fescue and both annual and perennial forbs. Utah juniper is present as is mountain big sagebrush, chokecherry, and antelope bitterbrush.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PIPO	<i>Pinus ponderosa</i>	Ponderosa pine
FEID	<i>Festuca idahoensis</i>	Idaho fescue
PSSP6	<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass
ANRO2	<i>Antennaria rosea</i>	Rosy pussytoes
ARTRW 8	<i>Artemisia tridentata ssp. wyomingensis</i>	Wyoming big sagebrush
PRVI	<i>Prunus virginiana</i>	Chokecherry

PUTR2	<i>Purshia tridentata</i>	Antelope bitterbrush
SYAL	<i>Symphoricarpos albus</i>	Common snowberry

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

Disturbance Description

Frequent, non-lethal surface fires were the dominant disturbance factor, occurring every 3-30yrs (Arno and Petersen 1993; Arno 1976; Fischer and Bradley 1987). Three-year fire return intervals (FRIs) are likely very localized and associated with Native American burning. However, there is some disagreement as to the extent of native burning. Typically, median FRIs are reported as about 30yrs. Mixed-severity fires likely occurred about every 50yrs depending on the vegetative state. Some believe that stand-replacement fires likely occurred in stands and small patches on the order of a few hundred acres every 300-700yrs depending on the vegetative state. Some authors and reviewers note that little information is available regarding the exact nature of stand-replacement fire severity in this Biophysical Setting (BpS).

Fischer and Bradley (1987), Fischer and Clayton (1983), and Smith and Fischer (1997) would characterize this BpS as predominantly Fire Groups 2 and 4 for western Montana and central Idaho, Fire Group 3 for eastern Montana and Wyoming, and Fire Group 1 for northern Idaho. Also refer to Crane and Fischer (1986).

In the Bighorn Basin of Wyoming, data collected in 2001 suggest that pre-settlement median FRI in the Big Horn Mountains was 26-53yrs. Stand-replacement fires were punctuated with pre-settlement fire scars found at intervals of 125yrs, 40yrs, 135yrs, and 29yrs prior to 1900. Both mixed-severity and stand-replacement fires were probably dependent upon droughts versus heavy precipitation years (Brown 2001).

Western pine beetle can attack large ponderosa pine in any canopy density.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	165	8	50	1000
Moderate (Mixed)	49	26	16	100
Low (Surface)	19	66	12	20
All Fires	13	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

Stands dominated by ponderosa pine with frequent FRIs commonly exhibit very small patch sizes even though fire events occurred over 100s or 1,000s of acres (Agee 1998). Open, late-seral stands typically dominated the landscape with frequent fire, though even-aged stands were uncommon. In Idaho, this type was often found as a narrow band between grassland/shrublands at lower elevations and Douglas-fir types at higher elevations.

Adjacency or Identification Concerns

Vegetation is characterized by Pfister et al. (1977) as the ponderosa pine series, by Steele et al. (1981) as the ponderosa pine series, and by Williams et al. (1995) as Douglas-fir-ponderosa pine.

These sites typically formed the lower timberline in the area and were historically found adjacent to grasslands and shrublands that dominated valley bottoms. The early seral stages often resemble adjacent shrubland or grassland BpS.

In the 21st century, after missing several FRIs, these stands may support an overabundance of stagnant ponderosa pine pole thickets, heavy duff and litter layers, and few grasses or shrubs. As a result, it may be difficult to distinguish this BpS in its mid and late seral stages from BpS 1045.

Many FRIs have been missed, and with severe Utah juniper encroachment, sapling and pole age classes may be absent. Some stands are heavily encroached with Downy brome. Lack of seedling establishment is an ongoing problem on the west slope of the Bighorn Mountains as is heavy encroachment with Downy brome and Utah juniper.

In north-central Wyoming, stands appear to be stagnant, containing only mature stems of a few cohorts. A cross section cut from a living tree in one stand extended a pith date of 1378-2000, making the tree a minimum of 623yrs old at the time of collection (Brown 2001). Tree ring analysis of stand structure documents pulsed recruitment of trees across the landscape, especially between 1770-1790. These west slope Bighorn Mountain cohorts are contemporaneous with a similar cohort found extensively in the Black Hills; both correspond with the wettest 20yr period in northern Great Plains precipitation reconstructions (Stinson, personal communication).

Dense pockets of Douglas-fir may also occur. This BpS may be found on several different habitat types depending on the local fire regime; a high-frequency, low-severity fire regime maintained these stands as ponderosa pine, but today they may be supporting Douglas-fir in some areas.

This vegetation type continues to be commercially logged. Site modifications include plantations and terraces.

Issues or Problems

For MZ22, this system was originally modeled as BpS 1053 Northern Rocky Mountain Ponderosa Pine Woodland, as it is thought that system/name better represents what is in MZ22.

For MZs 10 and 19: 1) Fischer and Bradley (1987) show only a single pathway from the dense pole stage characterized by succession without a fire disturbance (Class A to Class B). However, it seems that under a frequent fire regime, these stands would typically bypass Class B and move directly to Class C -- unless there is not enough fuel to carry fire at this stage or insufficient stand density and leaf litter. 2) Mixed-severity and stand-replacement FRIs are not well documented in the literature for this BpS. Some evidence suggests these fires indeed occurred, but there may be room to improve the assumptions used in this modeling effort. 3) There was some debate in the in-workshop peer review over the probability of mixed fire.

The southern portion of MZ10 may have supported a more frequent fire regime and thus more of Class D. The BpS was not split for MZ10.

Native Uncharacteristic Conditions

Cover >60% can be considered uncharacteristic in this woodland community.

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	C	B	B	B	B	B	B
Tree	10-25	C	C	C	C	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 11 Early Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
FEID	<i>Festuca idahoensis</i>	Idaho fescue	Lower
PSSP6	<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass	Lower
PIPO	<i>Pinus ponderosa</i>	Ponderosa pine	Upper
ANRO2	<i>Antennaria rosea</i>	Rosy pussytoes	Lower

Description

Fire-maintained grass/forb and/or seedlings and saplings. Grass species are the dominant lifeform in this class, attaining maximum heights of 3ft and being patchy in distribution (25-75% cover). Seedling/sapling size class would be <5in in diameter. There would be no large patches (10-100ac) of large or old-growth trees due to poor site conditions and abundance of rock outcroppings. However, dispersed, large-diameter fire remnant ponderosa pines with snag trees could be present. These large-diameter trees would have a density of less than one tree per acre.

Maximum Tree Size Class

Sapling >4.5ft; <5" DBH

Class B 8 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
ANRO2	Antennaria rosea	Rosy pussytoes	Lower
PSME	Pseudotsuga menziesii	Douglas-fir	Mid-Upper

Description

Grasses are the dominant lifeform with scattered seedlings and saplings; may have Utah juniper as incidentals. Larger, old-growth trees may be present in this class; the pole and medium diameter class (5-21in) occurring between these large trees is most abundant and characteristic of this class. May see large-diameter snags, dead and down trees present. High-density stunted pole stands are counted here; may see insect/disease here.

Maximum Tree Size Class

Sapling >4.5ft; <5" DBH

Class C 24 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
PSME	Pseudotsuga menziesii	Douglas-fir	Lower

Description

Open PIPO with an abundance of saplings and a few poles; a few Utah juniper may occur as incidentals. Larger, old-growth trees may be present in this class, but pole and medium (5-21in) diameter trees are what should be counted for this class. These patches have probably had recent fire or are drier, therefore retaining a more open condition.

Maximum Tree Size Class

Medium 9-21" DBH

Class D 48 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

Replacement Fire	Mid1:OPN	Early1:OPN	0.0033	303	Yes	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.016	63	No	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.05	20	No	0
Replacement Fire	Mid1:CLS	Early1:OPN	0.0067	149	Yes	0
Insects or Disease	Mid1:CLS	Mid1:OPN	0.01	100	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.06	17	Yes	0
Alternative Succession	Late1:OPN	Late1:CLS	1	1	Yes	25
Replacement Fire	Late1:OPN	Early1:OPN	0.002	500	Yes	0
Insects or Disease	Late1:OPN	Late1:OPN	0.01	100	No	0
Mixed Fire	Late1:OPN	Late1:OPN	0.014	71	No	0
Surface Fire	Late1:OPN	Late1:OPN	0.085	12	No	0
Replacement Fire	Late1:CLS	Early1:OPN	0.0033	303	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.04	25	Yes	0
Insects or Disease	Late1:CLS	Late1:OPN	0.04	25	Yes	0
Wind or Weather or Stress	Late1:CLS	Late1:OPN	0.05	20	Yes	0

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