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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 Zones

13, 14

Geographic Range

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

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 1,700-2,200m in map zone (MZ) 13 and MZ14. 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*, *Abies concolor*, and *Juniperus* spp. may be present in the tree canopy. The understory is usually shrubby with *Artemisia nova*, *Artemisia tridentata*, *Arctostaphylos pugnans*, *Cercocarpus ledifolius* var. *intermontanus*, *Purshia stansburiana*, *Ribes cereum*, *Purshia tridentata*, *Quercus gambelii*, *Symphoricarpos* spp., *Amelanchier utahensis*, and *Rosa* spp. Common grass species include *Pseudoroegneria spicata* and species of *Hesperostipa*, *Achnatherum*, *Hymenoides*, and *Poa fendleriana*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PIPO	<i>Pinus ponderosa</i>	Ponderosa pine
ABCO	<i>Abies concolor</i>	White fir
PIFL	<i>Pieris floribunda</i>	Mountain fetterbush
ARPU	<i>Arabis puberula</i>	Silver rockcress
SYLO	<i>Symphoricarpos longiflorus</i>	Desert snowberry
PSSP6	<i>Pseudoroegneria spicata</i>	Bluebunch wheatgrass
POFE	<i>Poa fendleriana</i>	Muttongrass

CELEI4	<i>Cercocarpus ledifolius</i> var. <i>intermontanus</i>	Curl-leaf mountain mahogany
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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. Literature is scarce for this particular geography. Biondi et al. (2011) found on Mt. Irish (southeastern Nevada) that the overall pre-European settlement mean fire return interval was 13yrs for the transition zone spanning the ponderosa pine and pinyon pine.

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	258	6	150	400
Moderate (Mixed)	39	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

Adjacency or Identification Concerns

It is usually found on sites that are dry montane with a variety of slopes, aspects, and soil conditions.

Issues or Problems

Ponderosa pine woodlands and savannas should be better researched for the Great Basin and Mojave Desert. Many scattered PIPO patches were completely logged during the mining era of 1850-1900 and during the railroad construction era throughout the western United States. Old sawmill structures in the Sheep Range indicate past logging close to extant ponderosa pine stands. 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 and Mojave Desert, but there is no quantitative or recorded evidence to support this plausible notion. 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),

Native Uncharacteristic Conditions

Ponderosa pine cover >60% is uncharacteristic. When ponderosa pine is encroached by white fir and limber pine, uncharacteristic tree cover is >80%.

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	B	B	B	B	B	B	B
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 13 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PIPO	<i>Pinus ponderosa</i>	Ponderosa pine	Upper
CELEI4	<i>Cercocarpus ledifolius</i> var. <i>intermontanus</i>	Curl-leaf mountain mahogany	Upper
SYOR	<i>Symphoricarpos orbiculatus</i>	Coralberry	Upper
POFE	<i>Poa fendleriana</i>	Muttongrass	Lower

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 10 Mid Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PIPO	<i>Pinus ponderosa</i>	Ponderosa pine	Upper
PIMO	<i>Pinus monophyla</i>	Singleleaf pinyon	Mid-Upper

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PIPO	<i>Pinus ponderosa</i>	Ponderosa pine	Upper
PIFL	<i>Pieris floribunda</i>	Mountain fetterbush	Upper
ABCO	<i>Abies concolor</i>	White fir	Upper
SYOR	<i>Symphoricarpos orbiculatus</i>	Coralberry	Lower

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
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

References

Barrett, S.W. 1988. Fire Suppression effects on Forest Succession within a Central Idaho Wilderness. *Western J. of Applied Forestry*. 3(3): 76-80.

Barrett, S.W. 1994. Fire Regimes on the Caribou National Forest, Southern Idaho. Final Report – Contract No. 53-02S2-3-05071. September 1994.

Biondi, F., Jamieson, L.P., Strachan, S. and Sibold, J., 2011. Dendroecological testing of the pyroclimatic hypothesis in the central Great Basin, Nevada, USA. *Ecosphere*, 2(1), pp.1-20.

Bradley, A.F., W.C. Fischer, N.V. Noste. 1992. Fire Ecology of the Forest Habitat Types of Eastern Idaho and Western Wyoming. Intermountain Research Station, Ogden UT 84401. GTR-INT-290.

Bradley, A.F., N.V. Noste, and W.C. Fischer. 1992. Fire Ecology of the Forests and Woodland in Utah. Intermountain Research Station, Ogden UT 84401. GTR-INT-287.

Brown, A., S.W. Barrett, J. Menakis. 1994. Comparing the Prescribed Natural Fire Program with Presettlement Fires in the Selway-Bitterroot Wilderness. *Int. J. Wildland Fire* 4(3): 157-168.

Brown, J.K. and J. Kapler-Smith, eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: USDA Forest Service, Rocky Mountain Research Station. 257 pp.

Crane, M.F. 1986. Fire Ecology of the Forest Habitat Types of Central Idaho. Intermountain Research Station, Ogden UT 84401. GTR-INT-218.

Fulé P.Z.; Swetnam, T.W.; Brown, P.M.; Falk, D.A.; Peterson, D.L.; Allen, C.D.; Aplet, G.H.; Battaglia, M.A.; Binkley, D.; Farris, C.; Keane, R.E.; Margolis, E.Q.; Grissino-Mayer, H.; Miller, C.; Sieg, C.H.; Skinner, C.; Stephens, S.L.; Taylor, A. 2014. Unsupported inferences of high-severity fire in historical dry forests of the western United States: response to Williams and Baker. *Global Ecology and Biogeography* 23: 825-830.

Kitchen, S.G. and E.D. McArthur. 2003. Ponderosa pine fire history in a marginal eastern Great Basin stand. Pages 152-156. In K.E.M. Galley, R.C. Klinger and N.G. Sugihara (eds.). *Proceedings of Fire Conference 2000: The first national congress on fire ecology, prevention, and management*. Miscellaneous Publication 13, Tall Timbers Research Station, Tallahassee, FL.

Morgan, P., S.C. Bunting., A.E. Black, T. Merrill and S. Barrett. 1996. Fire Regimes in the Interior Columbia River Basin: Past and Present. Final Report For RJVA-INT-94913: Course-

scale classification and mapping of disturbance regimes in the Columbia River Basin. Submitted to: Intermountain Fire Science Lab., Intermountain Research Station, Missoula, Montana, USDA Forest Service.

Nachlinger, J. and G.A. Reese. 1996. Plant community classification of the Spring Mountains National Recreation Area, Clark and Nye Counties, Nevada. Report submitted to USDA Forest Service, Humboldt-Toiyabe National Forest.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

Steele, R., R.D. Pfister, R.A. Ryker and J.A. Kittams. 1981. Forest Habitat Types of Central Idaho. USDA For. Serv. Tech. Rep. INT-114, 138 pp. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

Williams, M.A.; Baker, W.L. 2012. Comparison of the higher-severity fire regime in historical (A.D. 1800s) and modern (A.D. 1984–2009) montane forests across 624,156 ha of the Colorado Front Range. *Ecosystems* 15: 832-847.