

11670

Rocky Mountain Poor-Site Lodgepole Pine Forest

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Forest and Woodland

Map Zones

10, 19

Geographic Range

Northern Rockies, southwestern Montana, and central Idaho.

Biophysical Site Description

This type occurs on coarse, nutrient-poor soils derived largely from silicic rocks (rhyolite, granite, and some sterile sandstone). This type may be considered an edaphic climax that occurs on rocky soils in cold air pockets. These are subalpine forests where the dominance of *Pinus contorta* is related to topo-edaphic conditions and nutrient-poor soils. These include excessively well-drained pumice deposits; glacial till and alluvium on valley floors where there is cold air accumulation; warm, drought-prone shallow soils over fractured quartzite bedrock; and shallow, moisture-deficient soils with a significant component of volcanic ash. Soils on these sites are typically well drained, gravelly, coarse textured, acidic, and rarely formed from calcareous parent materials. Annual precipitation averages 25-35in, with fairly even distribution across the months, with slightly more in the spring and less during the summer.

Vegetation Description

Following stand-replacing fires, *Pinus contorta* rapidly colonizes and develops into dense, even-age stands and then persists on these sites that are too extreme for other conifers to establish. Mature to over-mature stands are dominated by slow-growing lodgepole pine (*Pinus contorta* Dougl.). Lodgepole pine occurs in nearly pure stands throughout all successional stages (i.e., lodgepole pine plays early-seral and quasi-climax roles in this system). These stands can be dense (80- to 100-ft² basal area).

Understory is typically sparse, except in gaps. Species may include Geyer's sedge, Ross' sedge, *Vaccinium* spp., pinegrass, twin flower, and kinnikinnick. Early succession stands can be dense with lodgepole pine seedlings and saplings that thin over time to widely spaced trees with a multi-age structure.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PICO	<i>Pinus contorta</i>	Lodgepole pine
CAGE2	<i>Carex geyeri</i>	Geyer's sedge

VASC	<i>Vaccinium scoparium</i>	Grouse whortleberry
CARU	<i>Calamagrostis rubescens</i>	Pinegrass
CARO5	<i>Carex rossii</i>	Ross' sedge

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

Disturbance Description

Fire is infrequent and often quite patchy due to lack of surface fuel. Winds carry crown fire for stand-replacing events. Mountain pine beetles kill trees in endemic and epidemic disturbance events. Large-diameter trees (>8in DBH) are preferred by mountain pine beetles; but, in epidemics, 5-in-DBH-class trees have been known to be killed. In general, younger trees are not host trees. Patches of mortality provide gaps for regeneration. Mortality of trees from mountain pine beetles produces fuel for large stand-replacing fires. The inter-relationship between fire and insects is the principle driver in this system. Mistletoe may cause mortality in older trees and a profusion of induced branches and partial crown mortality, which may predispose them to intense torching, which may lead to crown fire.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	332	88	300	600
Moderate (Mixed)	2465	12		
Low (Surface)				
All Fires	292	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

Patch size ranges from a few tens of acres to a few hundred on sandstone outcrops to areas of thousands to tens of thousands of acres on rhyolite and granitic substrates.

Adjacency or Identification Concerns

May be confused with dense stands of lodgepole-dominated seral stages of more moist subalpine forested environments. Seral lodgepole pine stands can be distinguished because they have a more continuous cover of herbaceous growth and have the occasional presence of spruce or fir seedlings. This Biophysical Setting (BpS) cannot support any coniferous species other than lodgepole pine.

This type corresponds to cool habitat types dominated by lodgepole pine (Pfister et al. 1977), but may not contain subalpine firs and spruce.

Issues or Problems

Native Uncharacteristic Conditions

Comments

Map zone (MZ) 10 and MZ19 were combined during 2015 BpS review.

Additional reviewer was Ward McCaughey (wmccaughey@fs.fed.us). Peer review resulted in a longer overall mean fire interval (175-300yrs) and a significant reduction in the amount of

mixed-severity fire (from ~40% to ~10%). There was some debate among reviewers about the exact nature of this BpS compared to subalpine seral lodgepole pine. Additional adjustments were made in the model description to clarify these differences.

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	D	D	D	D	D	D
Tree	25-50	C	C	C	C	D	D	D	D	D	D
Tree	>50	C	C	C	C	D	D	D	D	D	D

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
PICO	<i>Pinus contorta</i>	Lodgepole pine	Upper
CAGE2	<i>Carex geyeri</i>	Geyer's sedge	Low-Mid
CARO5	<i>Carex rossii</i>	Ross' sedge	Lower

Description

Sparse to dense lodgepole pine seedlings to young pole-size trees. Sparse herbaceous ground cover mostly of *Carex geyeri* and *C. rossii*. Lodgepole are slow growing.

Maximum Tree Size Class

Seedling <4.5ft

Class B 24 Mid Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	<i>Pinus contorta</i>	Lodgepole pine	None
CAGE2	<i>Carex geyeri</i>	Geyer's sedge	None
CARO5	<i>Carex rossii</i>	Ross' sedge	None

Description

Pole-size lodgepole pine and a sparse herbaceous layer dominated by *Carex geyeri*. Disturbance-caused gaps may cause a transition. Competition in the dog-hair condition may delay succession and prolong stay in this class. Self-thinning causes a transition.

Maximum Tree Size Class

Pole 5-9" DBH

Class C	14	Mid Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	<i>Pinus contorta</i>	Lodgepole pine	None
CAGE2	<i>Carex geyeri</i>	Geyer's sedge	None
CARO5	<i>Carex rossii</i>	Ross' sedge	None
VASC	<i>Vaccinium scoparium</i>	Grouse whortleberry	None

Description

Pole-size lodgepole pine with a *Carex* spp.-dominated understory.

Maximum Tree Size Class

Pole 5-9" DBH

Class D	50	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	<i>Pinus contorta</i>	Lodgepole pine	None
CAGE2	<i>Carex geyeri</i>	Geyer's sedge	None
CARO5	<i>Carex rossii</i>	Ross' sedge	None
VASC	<i>Vaccinium scoparium</i>	Grouse whortleberry	None

Description

Nearly homogenous even-age or uneven-age lodgepole pine stands with limited recruitment in gaps. Understory herbaceous cover is sparse and limited to where there is sunlight. Mountain pine beetle infestations at epidemic levels may cause transition. Blowdowns and endemic population levels of beetles result in opening and the transition.

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	39
Mid1:OPN	40	Late1:CLS	150
Mid1:CLS	40	Late1:CLS	150
Late1:CLS	150	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
Mixed Fire	Early1:ALL	Early1:ALL	0.0004	2500	No	0
Replacement Fire	Early1:ALL	Early1:ALL	0.003	333	Yes	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.0004	2500	No	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.003	333	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.0004	2500	Yes	0
Insects or Disease	Mid1:CLS	Mid1:OPN	0.001	1000	Yes	0
Competition or Maintenance	Mid1:CLS	Mid1:CLS	0.001	1000	No	0
Wind or Weather or Stress	Mid1:CLS	Early1:ALL	0.001	1000	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.003	333	Yes	0
Mixed Fire	Late1:CLS	Mid1:OPN	0.0004	2500	Yes	0
Wind or Weather or Stress	Late1:CLS	Mid1:OPN	0.001	1000	Yes	0
Insects or Disease	Late1:CLS	Mid1:OPN	0.001	1000	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.003	333	Yes	0

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