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Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Forest and Woodland

Map Zones

10, 19

Geographic Range

Northeastern Washington, northern and central Idaho, and northwestern Montana.

Biophysical Site Description

Subalpine zone, with lower extent at ~4,500ft (in northeastern Washington) or 6,500ft (in Montana and Idaho) and the upper extent at ~8,500ft.

Vegetation Description

Lodgepole pine, subalpine fir, and Engelmann spruce dominate. Lodgepole pine comprises a greater component on drier sites and earlier successional stages and can be a canopy dominant for >250yrs in some stands (Kipfmüller and Kupfer 2005). Pockets of pure lodgepole pine are not uncommon. At high elevations and southerly aspects, whitebark pine may occur. Western larch and Douglas-fir may be early seral components at lower portions of this Biophysical Setting (BpS). Aspen may be present, especially east of the Continental Divide and in the southern portions of map zones (MZs) 10 and 19. Mountain hemlock may be present in the north and west portions of MZs 10 and 19.

Understory associates may include: *Vaccinium scoparium*, beargrass (*Xerophyllum tenax*), *Rhododendron albiflorum*, *Linnaea borealis*, *Menziesia ferruginea*, and *Alnus sinuata*.

Understory shrubs will be more prevalent on east- and north-facing aspects.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir
PIEN	<i>Picea engelmannii</i>	Engelmann spruce
PICO	<i>Pinus contorta</i>	Lodgepole pine
CAGE	<i>Carex geophila</i>	White mountain sedge
CARU	<i>Calamagrostis rubescens</i>	Pinegrass

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

Disturbance Description

Fire regime characterized by primarily moderately long-interval mixed and stand-replacement fires. Lightning strikes are frequent but will often result in small, patchy spot fires. Some recent data show more frequent mean fire return intervals (8-71yrs) in systems that may include this BpS (Elaine Sutherland, USFS Rocky Mountain Research Station, personal communication, August 2005). In southern and western portions of MZs 10 and 19, this BpS may have more frequent fire regimes.

In some areas, spruce beetle and mountain pine beetle can influence successional stage, species composition, and stand density. Spruce beetle and mountain pine beetle may act to accelerate succession by removing the lodgepole pine and promoting the more shade-tolerant species. Large-scale insect infestations may create large patches of early seral conditions and/or create conditions that lead to large, stand-replacement fires.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	207	67	100	600
Moderate (Mixed)	417	33		
Low (Surface)				
All Fires	138	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

Fires could range widely in size from 1,000s to 100,000s of acres. Smith and Fischer (1997) suggest fires ranged from 500-1,000ac. Spot fires are common (Williams et al. 1995). Variability of climate, topography, and other site factors can result in a wide range of representation of successional stages on the landscape (Schoennagel et al. 2004). Equilibrium landscapes are not likely to develop in areas <500,000ac.

Adjacency or Identification Concerns

This BpS corresponds to the following habitat types (Pfister et al. 1977): ABLA/CAGE, ABLA/VASC, TSME/XETE, TSME/MEFE, TSME/CLUN, PICEA/GART, PICEA/LIBO, and PICEA/PHMA.

In northeastern Washington and northern Idaho, this type may transition to mountain hemlock, where it becomes more maritime.

Non-native insects and disease, including balsam wooly adelgid and whitebark pine blister rust, affect these forests today. Some local populations of whitebark pine have experienced >90% mortality from blister rust.

At lower elevations, this type is adjacent to upper montane, including western hemlock, western red cedar, grand fir, and Douglas-fir. At higher elevations, it is adjacent to Northern Rocky Mountain Subalpine Woodland and Parkland (1046).

Issues or Problems

Fire regimes in this system are strongly related to climatic cycles. Long-term changes in climate as well as interannual climate variability will affect the frequency of fire in this system and its distribution along an elevational gradient.

Moisture gradients control the fire regime of these systems relative to the lower-elevation montane mixed conifer types (eg, BpS 1045). Disturbance regimes may operate on a similar gradient. Where this system is in close proximity to montane mixed conifer systems, fire regimes may be more similar to the mixed conifer system (i.e., more frequent with more mixed-severity fire).

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	C	B	B	B	B	B	B
Tree	10-25	D	D	D	D	E	E	E	E	E	E
Tree	10-25	C	C	C	C	B	B	B	B	B	B
Tree	25-50	C	C	C	C	B	B	B	B	B	B
Tree	25-50	D	D	D	D	E	E	E	E	E	E
Tree	>50	C	C	C	C	B	B	B	B	B	B
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 **16** **Early Development 1 - All Structures**

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	<i>Pinus contorta</i>	Lodgepole pine	Upper
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir	Lower
PIEN	<i>Picea engelmannii</i>	Engelmann spruce	Lower

Description

Early succession stage after long interval replacement fires. There can be extended periods (as long as 300yrs) of grass/seedling stage after fire replacement events. Whitebark pine may be present in central Idaho and southwestern Montana. Western larch and Douglas-fir may be present in northern Idaho, eastern Washington, and western Montana.

Maximum Tree Size Class

Sapling >4.5ft; <5" DBH

Class B	44	Mid Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	Pinus contorta	Lodgepole pine	Upper
ABLA	Abies lasiocarpa	Subalpine fir	Low-Mid
PIEN	Picea engelmannii	Engelmann spruce	Low-Mid

Description

High-density lodgepole pine with spruce-fir in mid story. Tree heights of lodgepole pine will rarely exceed 25m.

Maximum Tree Size Class

Medium 9-21" DBH

Class C	15	Mid Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PICO	Pinus contorta	Lodgepole pine	Upper
ABLA	Abies lasiocarpa	Subalpine fir	Low-Mid
PIEN	Picea engelmannii	Engelmann spruce	Low-Mid

Description

Low-density pole to medium-diameter trees. Primarily occurs after mixed-severity fires, on droughty substrates, or after insects or disease thin denser stands. Reburn events may also result in lack of seed source. Douglas-fir and whitebark pine may be present in this class.

Maximum Tree Size Class

Medium 9-21" DBH

Class D	5	Late Development 1 - Open
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Indicator Species

Alternative Succession	Early1:ALL	Mid1:OPN	0.003	333	Yes	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.002	500	No	0
Insects or Disease	Mid1:OPN	Mid1:OPN	0.002	500	No	0
Alternative Succession	Mid1:OPN	Late1:OPN	0.002	500	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.002	500	Yes	0
Competition or Maintenance	Mid1:CLS	Mid1:CLS	0.001	1000	No	0
Wind or Weather or Stress	Mid1:CLS	Mid1:OPN	0.002	500	Yes	0
Insects or Disease	Mid1:CLS	Mid1:OPN	0.002	500	Yes	0
Insects or Disease	Mid1:CLS	Early1:ALL	0.002	500	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.003	333	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.006	167	Yes	0
Insects or Disease	Late1:OPN	Late1:OPN	0.001	1000	No	0
Wind or Weather or Stress	Late1:OPN	Mid1:OPN	0.002	500	Yes	0
Mixed Fire	Late1:OPN	Mid1:OPN	0.002	500	Yes	0
Insects or Disease	Late1:OPN	Mid1:OPN	0.002	500	Yes	0
Wind or Weather or Stress	Late1:OPN	Late1:OPN	0.002	500	No	0
Mixed Fire	Late1:OPN	Late1:OPN	0.002	500	No	0
Competition or Maintenance	Late1:OPN	Late1:OPN	0.002	500	No	0
Replacement Fire	Late1:OPN	Early1:ALL	0.002	500	Yes	0
Mixed Fire	Late1:CLS	Mid1:OPN	0.001	1000	Yes	0
Insects or Disease	Late1:CLS	Mid1:OPN	0.001	1000	Yes	0
Insects or Disease	Late1:CLS	Early1:ALL	0.001	1000	Yes	0
Wind or Weather or Stress	Late1:CLS	Late1:OPN	0.002	500	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.002	500	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.008	125	Yes	0

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