

10452

Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest - Larch

BpS Model/Description Version: Aug. 2020

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Vegetation Type

Forest and Woodland

Map Zones

10, 19

Model Splits or Lumps

This Biophysical Setting (BpS) is split into multiple models. This BpS is split into three types based on dominance: one dominated by ponderosa pine with Douglas-fir; one dominated by western larch; and one dominated by grand fir.

Geographic Range

Western Montana and northern Idaho, west of the Continental Divide.

Biophysical Site Description

Montane and lower subalpine zones, approximately 3,000-6,000ft primarily on north-facing aspects west of the Continental Divide. Lower subalpine sites typically occur as relatively moist subalpine fir habitat types.

Vegetation Description

Western larch occurs on more mesic/northerly Douglas-fir habitat types and more moist, productive subalpine fir habitat types. Larch is mixed in with seral Douglas-fir, lodgepole pine, or some ponderosa pine in the overstory. At lower elevations within this BpS, lodgepole pine can be the dominant seral species and will persist in areas where the fire return intervals are less than ~80yrs (Williams et al. 1995, observation of White Mountain 1988 fire area in the Colville National Forest). Longer fire intervals promote the development of Engelmann spruce and subalpine fir stands. Mountain pine beetles often reduce the lodgepole pine component, possibly promoting mixed-severity fires and inclusions of stand-replacing fires.

Understory species include: *Vaccinium globulare*, *Clintonia uniflora*, *Menziesia ferruginia*, *Linnea borealis*, *Alnus sinuate*, and *Physocarpus malvaceus*.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
LAOC	<i>Larix occidentalis</i>	Western larch
PICO	<i>Pinus contorta</i>	Lodgepole pine

PSME	<i>Pseudotsuga menziesii</i>	Douglas-fir
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir

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

Disturbance Description

Mean fire return interval (MFRI) of ~40yrs. The fire regime is dominated by mixed-severity fire, with more rare replacement fire and occasional small, patchy surface fires.

Naficy et al. (2015) found a composite patch-level median fire interval of 37yrs (minimum 18, maximum 74) in mixed conifer forests in northwest Montana on the Flathead National Forest. The study site included Douglas-fir, ponderosa pine (*Pinus ponderosa*), western larch (*Larix occidentalis*), lodgepole pine, grand fir (*Abies grandis*), and occasional western white pine (*Pinus monticola*), Engelmann spruce (*Picea engelmannii*), and subalpine fir (*Abies lasiocarpa*). The study concluded that most fires were mixed severity (defined as a mix of low, moderate, or high severity) and that high-severity fire was common.

Johnston (2016) found that dry-moist mixed conifer with a larch component prior to 1900 may have burned as frequently as the dry ponderosa pine types in the southern Blue Mountains in Oregon. He reported a MFRI of 12-21yrs from 1760-1890 and found little evidence of replacement severity patches over the time period he reconstructed age structure (since 1860).

Mountain pine beetle will reduce canopy cover of lodgepole pine. Mistletoe may affect western larch stands but is not included in the quantitative model.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	202	19	50	250
Moderate (Mixed)	69	54	20	140
Low (Surface)	138	27		
All Fires	38	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

Scale can be in small patches of 50ac but generally is 100s to 1,000s of acres (due to stand-replacing fires requiring dry conditions or being wind-driven).

Adjacency or Identification Concerns

The mixed conifer zone in the Northern Rockies is broad and represents a moisture gradient that affects fire regimes and species dominance. The Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland system was thus split into three BpSs to represent differences in species dominance and fire regimes. BpS 10451 represents the drier sites and is dominated by ponderosa pine and Douglas-fir with a very frequent, low-severity fire regime. BpS 10452 is dominated by western larch and represents slightly more mesic sites. The fire regime is dominated by moderately frequent, mixed-severity fires. BpS 10453 is dominated by grand fir and represents more mesic, cool sites with longer mixed-severity fire regimes.

This system equates with Pfister et al.'s (1977) moist Douglas-fir, subalpine fir, and mesic grand fir habitat types: ABLA/CLUN, all phases, ABLA/LIBO, ABLA/MEFE, ABGR/CLUN, PSME/PHMA, PSME/VAGL, PSME/LIBO (PSME habitat types apply only to Montana, not to Idaho).

Johnston (2017) documented a shift in the species composition of dry-moist mixed conifer in the southern Blue Mountains from 1860-2010. He found that stand regeneration after 1890 was dominated by grand fir and that there was a corresponding decrease in western larch, Douglas-fir, and ponderosa pine.

Issues or Problems

Native Uncharacteristic Conditions

Comments

Kerry Kemp reviewed this model during the 2016 BpS Review. Surface fire was added to the closed states as a result of review and in line with Naficy et al. (2015), which suggests that this BpS experienced a mix of low- and moderate-severity fires.

Additional author was Ed Lieser (elieser@fs.fed.us). Dan Leavell and Cathy Steward provided additional post-workshop review of this model. This model was originally conceived for the BpS "Northern Rocky Mountain Western Larch Woodland" and was revised slightly to be a split within the Dry-Mesic Mixed Conifer BpS (Pohl 18 November 2005).

LANDFIRE National reviewers agreed that MFRI should be more frequent (from 60yrs to 40yrs) with the inclusion of more frequent mixed-severity fire. Two reviewers agreed that surface fire should be included at a low probability. The results of these changes were less Class E, more Class D, and a more frequent MFRI.

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	B	B	B	B	B	B
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

Description

Indicator Species

Description

Recent observations of this succession stage in the White Mountain 1988 fire area in the Colville National Forest show *Alnus sinuata*, *Salix scouleriana*, and western larch dominating upper layers at higher elevations; at lower elevations, lodgepole pine and *Salix scouleriana* dominate. *Abies lasiocarpa* and *Picea engelmannii* are present at low cover values in the lower canopy at all elevations (Colville National Forest ecology data).

Sapling >4.5ft; <5" DBH

Indicator Species

Description

Larch, lodgepole, and Douglas-fir (poles to medium trees) continue to dominate. Without disturbance, Douglas-fir can increase in understory. Subalpine fir may be present. Canopy cover rarely exceeds 60%.

Medium 9-21" DBH

Class C	24	Mid Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
LAOC	<i>Larix occidentalis</i>	Western larch	Upper
PSME	<i>Pseudotsuga menziesii</i>	Douglas-fir	Upper
PICO	<i>Pinus contorta</i>	Lodgepole pine	Upper
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir	Middle

Description

Larch, with some Douglas-fir, lodgepole, and subalpine fir. Open condition is created by disturbance (fire, insect, or disease), which opens up more closed conditions (i.e., Class B or Class E).

Maximum Tree Size Class

Medium 9-21" DBH

Class D	29	Late Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
LAOC	<i>Larix occidentalis</i>	Western larch	Upper
PSME	<i>Pseudotsuga menziesii</i>	Douglas-fir	Upper
PICO	<i>Pinus contorta</i>	Lodgepole pine	Mid-Upper
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir	Middle

Description

Large larch and Douglas-fir, favored by disturbance. Subalpine fir, grand fir, and lodgepole pine will be reduced or eliminated by fire, insect, or disease.

Maximum Tree Size Class

Very Large >33" DBH

Class E	24	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir	Upper
PSME	<i>Pseudotsuga menziesii</i>	Douglas-fir	Upper
LAOC	<i>Larix occidentalis</i>	Western larch	Upper
ABGR	<i>Abies grandis</i>	Grand fir	Mid-Upper

Description

Large-diameter larch and Douglas-fir dominate overstory; subalpine fir and grand fir are present in the middle and understory. Lodgepole pine will be largely absent.

Canopy cover will rarely exceed 60%.

Maximum Tree Size Class

Very Large >33" DBH

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Mid1:CLS	19
Mid1:OPN	20	Late1:OPN	79
Mid1:CLS	20	Late1:CLS	79
Late1:OPN	80	Late1:CLS	119
Late1:CLS	80	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	0.001	1000	Yes	0
Alternative Succession	Early1:ALL	Mid1:OPN	0.01	100	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.005	200	Yes	0
Surface Fire	Mid1:OPN	Mid1:OPN	0.008	125	No	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.02	50	No	0
Wind or Weather or Stress	Mid1:CLS	Mid1:OPN	0.001	1000	Yes	0
Competition or Maintenance	Mid1:CLS	Mid1:CLS	0.002	500	No	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.004	250	Yes	0
Insects or Disease	Mid1:CLS	Mid1:OPN	0.005	200	Yes	0
Surface Fire	Mid1:CLS	Mid1:CLS	0.008	125	No	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.01	100	Yes	0
Insects or Disease	Late1:OPN	Mid1:OPN	0.003	333	Yes	0
Wind or Weather or Stress	Late1:OPN	Late1:OPN	0.003	333	No	0
Replacement Fire	Late1:OPN	Early1:ALL	0.004	250	Yes	0
Surface Fire	Late1:OPN	Late1:OPN	0.008	125	No	0
Insects or Disease	Late1:OPN	Late1:OPN	0.01	100	No	0

Mixed Fire	Late1:OPN	Late1:OPN	0.02	50	No	0
Wind or Weather or Stress	Late1:CLS	Mid1:OPN	0.003	333	Yes	0
Surface Fire	Late1:CLS	Late1:CLS	0.008	125	No	0
Replacement Fire	Late1:CLS	Early1:ALL	0.008	125	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.01	100	Yes	0
Insects or Disease	Late1:CLS	Late1:OPN	0.01	100	Yes	0

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