

10550

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

15, 28

Model Splits or Lumps

This BpS is lumped with: Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland (BpS 10560). The descriptions and models are identical.

Geographic Range

Colorado, northern New Mexico, and parts of Arizona and Utah. Elevations typically range from 2,875-3,355m (9,500-11,000ft). Engelmann spruce and subalpine fir forests comprise a substantial part of the subalpine forests of the Cascades and Rocky Mountains from southern British Columbia east into Alberta, south into NM and the Intermountain region. They are the matrix forests of the subalpine zone, with elevations ranging from 1,275m in its northern distribution to 3,355m in the south (4,100-11,000ft). They often represent the highest elevation forests in an area. Despite their wide distribution, the tree canopy characteristics are remarkably similar, with *Picea engelmannii* and *Abies lasiocarpa* dominating either mixed or alone. In some areas, such as Wyoming, *Picea engelmannii*-dominated forests are on limestone or dolomite, while nearby codominated spruce-fir forests are on granitic or volcanic rocks. Xeric species may include *Juniperus communis*, *Linnaea borealis*, *Mahonia repens*, or *Vaccinium scoparium*.

Biophysical Site Description

Biophysical Setting (BpS) occurs in the subalpine zone on gentle to moderately steep terrain (e.g., 10-60% slope). Sites within this system are cold year-round, and precipitation is predominantly in the form of snow, which may persist until late summer. Snowpacks are deep and late-lying, and summers are cool. Frost is possible almost all summer and may be common in restricted topographic basins and benches.

Vegetation Description

The overstory is typically dominated by Engelmann spruce and/or subalpine fir. Other tree species may include lodgepole pine, aspen, limber pine, bristlecone pine and Douglas-fir. Cork bark fir occurs in the southern part of the zone. *Pinus contorta* may be common in some areas. *Populus tremuloides* may also occur.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PIEN	<i>Picea engelmannii</i>	Engelmann spruce
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir
PICO	<i>Pinus contorta</i>	Lodgepole pine
POTR5	<i>Populus tremuloides</i>	Quaking aspen

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

Disturbance Description

Disturbance includes occasional blowdown, insect outbreaks and stand-replacing fire. Fire Regimes V and IV: Primarily long-interval (e.g., 150-300yrs) stand replacement fires, with minor amount of terrain influenced by moderately long-interval (e.g., 50-100yrs) mixed severity fires. Disturbances also include insect/disease and windthrow events.

In BpS review of 2017, it was suggested that surface fires be added to this type as well. Patch size would vary but could be in the 10s of acres or less and somewhat frequent (e.g., 10-500yrs and 2% of all fires). While evidence of these fires was found in literature, specificity as to return interval, succession classes, and impacts were not found in literature (see Sherriff 2001); therefore surface fires were not included. LANDFIRE suggests local modelers include surface fires where more definitive information exists.

The relationship between spruce beetle and fire disturbances is complex, with some authors noting no increase in fire with an increase in spruce beetle (Andrus 2016). This can be due to a thinning effect by the beetles. Page et al. (2014) report changes in spruce flammability that can change ignition probability. Also see Jolly et al. (2012) and Page et al. (2012).

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	194	69	150	300
Moderate (Mixed)	424	31		
Low (Surface)				
All Fires	133	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 sizes vary but are mostly in the 100s of acres, with occasional very large patches (disturbances) in the 1,000s of acres. There may be frequent small disturbances in the 10s of acres or less.

Adjacency or Identification Concerns

BpS 1056 (Mesic-Wet Spruce-Fir) and 1055 (Dry-Mesic Spruce-Fir) are similar.

Issues or Problems

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	C	B	B	B	B	B
Tree	10-25	D	D	D	D	D	E	E	E	E	E
Tree	25-50	D	D	D	D	D	E	E	E	E	E
Tree	>50	D	D	D	D	D	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 14 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PIEN	<i>Picea engelmannii</i>	Engelmann spruce	All
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir	All

Description

Early succession after moderately-long to long interval replacement fires.

Maximum Tree Size Class

Pole 5-9" DBH

Class B 19 Mid Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PIEN	<i>Picea engelmannii</i>	Engelmann spruce	Upper
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir	Upper

Description

Shade tolerant and mixed conifer saplings to poles.

Maximum Tree Size Class

Medium 9-21"DBH

Class C	18	Mid Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PIEN	<i>Picea engelmannii</i>	Engelmann spruce	Upper
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir	Upper

Description

Primarily moderately tolerant saplings to poles.

Maximum Tree Size Class

Medium 9-21"DBH

Class D	17	Late Development 1 - Open
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PIEN	<i>Picea engelmannii</i>	Engelmann spruce	Upper
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir	Upper

Description

Poles and larger diameter moderately shade tolerant conifer species in small to moderate size patches, generally on south aspects.

Maximum Tree Size Class

Large 21-33"DBH

Class E	32	Late Development 1 - Closed
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
PIEN	<i>Picea engelmannii</i>	Engelmann spruce	Upper
ABLA	<i>Abies lasiocarpa</i>	Subalpine fir	Upper

Description

Pole and larger diameter moderately to shade tolerant conifer species, in moderate to large size patches, all aspects.

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:OPN	79
Mid1:CLS	40	Late1:CLS	129
Late1:OPN	80	Late1:CLS	129
Late1:CLS	130	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
Competition or Maintenance	Early1:ALL	Early1:ALL	0.002	500	No	0
Replacement Fire	Early1:ALL	Early1:ALL	0.005	200	Yes	0
Alternative Succession	Early1:ALL	Mid1:OPN	0.02	50	Yes	0
Mixed Fire	Mid1:OPN	Mid1:OPN	0.002	500	No	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.005	200	Yes	0
Alternative Succession	Mid1:OPN	Mid1:CLS	0.0125	80	Yes	0
Competition or Maintenance	Mid1:CLS	Mid1:CLS	0.001	1000	No	0
Insects or Disease	Mid1:CLS	Mid1:OPN	0.002	500	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.005	200	Yes	0
Mixed Fire	Mid1:CLS	Mid1:OPN	0.01	100	Yes	0
Wind or Weather or Stress	Late1:OPN	Late1:OPN	0.002	500	No	0
Insects or Disease	Late1:OPN	Late1:OPN	0.003	333	No	0
Replacement Fire	Late1:OPN	Early1:ALL	0.005	200	Yes	0
Insects or Disease	Late1:CLS	Late1:OPN	0.002	500	Yes	0
Wind or Weather or Stress	Late1:CLS	Mid1:OPN	0.005	200	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.005	200	Yes	0

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