

10560

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

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
Steve Barrett	sbarrett@mtdig.net	Cathy Stewart	cstewart@fs.fed.us
None	None	None	None
None	None	None	None

Vegetation Type

Forest and Woodland

Map Zones

20

Geographic Range

Northern Rockies, including MT, ID and WY. This BpS is thought to be very limited in extent in MZ20.

Biophysical Site Description

Upper subalpine zone and mesic sites. Occurrences are typically found in locations with cold-air drainage or ponding, or where snowpacks linger late into the summer, such as north-facing slopes and high-elevation ravines. They can extend down in elevation below the subalpine zone in places where cold-air ponding occurs; northerly and easterly aspects predominate. These forests are found on gentle to very steep mountain slopes, high-elevation ridgetops and upper slopes, plateau-like surfaces, basins, alluvial terraces, well-drained benches and inactive stream terraces. Reviewers for MZ20 felt that the proceeding sentence does not align with this BpSs shrub understory component, as this BpS has moist-driven shrubs and may occur near riparian areas.

Vegetation Description

Engelmann spruce and subalpine fir dominate on most aspects with lodgepole pine comprising a greater component on dryer sites or earlier successional stages. Early successional vegetation contains *Eurybia conspicua* and *Carex geyeri*. *Vaccinium scoparium* is a common understory associate in later successional stages.

Mesic understory shrubs include *Menziesia ferruginea*, *Vaccinium membranaceum*, *Rubus parviflorus*, and *Ledum glandulosum*. Herbaceous species include *Actaea rubra*, *Maianthemum stellatum*, *Cornus canadensis*, *Erigeron engelmannii*, *Saxifraga bronchialis*, *Lupinus argenteus* ssp. *subalpinus*, *Valeriana sitchensis*, and graminoids such as *Carex generii* and *Calamagrostis canadensis*.

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

Disturbance Description

Fire Regime Group V or IV; primarily long-interval stand replacement fires. In some areas, spruce beetle can influence successional stage, species composition and stand density. Spruce beetle may act to accelerate succession.

For MZ21, all modelers and reviewers agreed that this fire return interval should be greater than 300yrs. Most of the fire is modeled as replacement fire. There might be some mixed severity fire in this system, and it is modeled in the late closed state, as per modelers and reviewers.

For MZ20, overall MFI would not be greater than 200yrs. Unlike in central WY and CO and Greater Yellowstone Ecosystem, the overall MFI should be no more than 200yrs for MZ20 spruce-fir stands, because this relatively minor BpS is heavily affected by contagion (i.e. reflects the influence from more-frequent fire regimes that dominate the neighborhood).

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	216	93	100	600
Moderate (Mixed)	2905	7		
Low (Surface)				
All Fires	201	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 from 1,000s to 10,000s of acres. Variability of climate, topography and other site factors can result in a wide range of representation of successional stages on the landscape. Equilibrium landscapes are not likely to develop in areas <500,000ac, or perhaps not in areas greater than that either (Romme, personal correspondence). Reviewers state that typical fires in this system are small clumps of stand replacing fires with spots to adjacent clumps. However, when this BpS is viewed in context within a larger landscape with the surrounding lodgepole pine BpS (as is the case in MZ20), large and uniform replacement fires are more typical.

Adjacency or Identification Concerns

Adjacent to drier, lower subalpine forests (lodgepole-spruce-fir) and to krummholz and alpine vegetation. This system typically has more precipitation and longer winters than lower subalpine types.

Climate (severely dry conditions) is the primary driver of fire regimes in this system. Long-term changes in climate as well as interannual climate variability will affect the frequency of fire in this system.

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

Currently, balsam bark beetle is killing subalpine fir trees throughout the Rocky Mountain subalpine mesic spruce fir region.

Issues or Problems

Reviewers state that since 1990, mortality in the subalpine fir complex has increased.

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	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 16 Early Development 1 - All Structures

Indicator Species

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

Description

Class D	15	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
PICO	<i>Pinus contorta</i>	Lodgepole pine	Upper

Description

Poles and larger diameter moderately shade tolerant conifer species in small to moderate size patches. Patches would include subalpine fir seedlings. This stage occupies 15-50% of the landscape.

Maximum Tree Size Class

Medium 9-21"DBH

Class E	34	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
PICO	<i>Pinus contorta</i>	Lodgepole pine	Upper

Description

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

It is thought that the reference condition state for this BpS would be dominated by these closed stages, maybe reaching 80% of the landscape - even though 65% is modeled here.

Maximum Tree Size Class

Medium 9-21"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	149
Mid1:CLS	40	Late1:CLS	149
Late1:OPN	150	Late1:OPN	999
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
Alternative Succession	Early1:ALL	Mid1:OPN	0.001	1000	Yes	0
Replacement Fire	Early1:ALL	Early1:ALL	0.005	200	Yes	0
Replacement Fire	Mid1:OPN	Early1:ALL	0.005	200	Yes	0
Wind or Weather or Stress	Mid1:CLS	Mid1:OPN	0.001	1000	Yes	0
Replacement Fire	Mid1:CLS	Early1:ALL	0.005	200	Yes	0
Insects or Disease	Late1:OPN	Mid1:OPN	0.001	1000	Yes	0
Alternative Succession	Late1:OPN	Late1:CLS	0.001	1000	Yes	0
Replacement Fire	Late1:OPN	Early1:ALL	0.005	200	Yes	0
Mixed Fire	Late1:CLS	Late1:OPN	0.001	1000	Yes	0
Insects or Disease	Late1:CLS	Late1:OPN	0.001	1000	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.004	250	Yes	0

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