11430
Rocky Mountain Alpine Fell-Field

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
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Vegetation Type
Herbaceous

Map Zones
9, 19, 21, 28

Geographic Range
This ecological system is found discontinuously at alpine elevations throughout the Rocky Mountains.

Biophysical Site Description
These are wind-scoured fell-fields that are free of snow in the winter, such as ridgetops and exposed saddles, exposing the plants to severe environmental stress. Soils on these windy, unproductive sites are shallow, stony, low in organic matter, and poorly developed. Wind deflation often results in a gravelly pavement. “Fell” is Gaelic for “stone”; a fell-field is a stone field. Sites are stable for hundreds to thousands of years as soils develop. They are, essentially, scree slopes.

Vegetation Description
Most fell-field plants are cushioned or matted, frequently succulent, flat to the ground in rosettes, and often densely haired and thickly cutinized. Plant cover is 15-50% whereas exposed rock makes up the rest. Fell-fields are usually within or adjacent to alpine tundra dry meadows.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
SIAC	*Silene acaulis*	Moss campion
TRNA2	*Trifolium nanum*	Dwarf clover
PHCO11	*Phlox condensata*	Dwarf phlox
FEBR	*Festuca brachyphylla*	Alpine fescue
CLME	*Claytonia megarhiza*	Alpine springbeauty
DROCH	*Dryas octopetala ssp. hookeriana*	Hooker’s mountain-avens

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

Disturbance Description
Vegetation in these areas is controlled by snow retention, wind desiccation, permafrost, and a short growing season. Dry summers associated with major drought years (mean return interval, 100yrs) favor grasses over forbs, whereas wet summers cause a more diverse mixture of forbs and graminoids.

Avalanches on steeper slopes where soil has accumulated can cause infrequent soil slips, which exposed bare ground.

Very small burns of a few square meters (replacement fire) caused by lightning strikes were included as a rare disturbance, although lighting storms are frequent at those elevations. The calculation of lightning strike frequency was not based on fire return intervals (FRIs), but on the number of strikes (in this case, five) per 1,000 possible locations per year; thus, 0.005. FRI is modeled at approximately 525yrs. A contributor for map zone (MZ) 21 felt that fire frequency is insignificant enough in the alpine BpSs in that zone that all alpine BpSs could be combined based on fire frequency; however, the alpine BpSs do have different species composition and biophysical gradients; therefore, the alpine types were not combined.

Alpine rodents (pikas, marmots, etc.) cause common but generally small-scale disturbances in these systems. Native herbivores (Rocky Mountain bighorn sheep, mule deer, and elk) were common in the alpine but probably did not greatly affect vegetation cover because animals move frequently as they reduce vegetation cover.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement	521	100		
Moderate (Mixed)				
Low (Surface)				
All Fires	521	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

This ecological system can occupy large areas of the alpine. Patch size varies from a few acres to 1,000ac on mountain ridges and tops. Stand-replacement fires may be caused by lightning strikes that do not spread due to the sparse cover of fine fuel and extensive barren areas that act as fire breaks.

Adjacency or Identification Concerns

During the next decades, several experts claim that the alpine is one of the more threatened community types by global climate change. Essentially, the tree line is moving up. There is also an acid rain concern, especially in the Wind River Range for MZ21.

Issues or Problems

No data on fire or effects of lightning strikes. No data on recovery time after stand-replacing events. Species were derived from literature review. Modelers were uncertain about the amount of time it takes to succeed from Class A to Class B in the model. Moss campion, which flowers at 10yrs, was used to estimate growth rate.

Native Uncharacteristic Conditions

Cover of vegetation >50% indicates a system other than Rocky Mountain Alpine Fell-Field because rock cover is 50% or more in this community.

Comments

MZs 9, 19, 21, and 28 were combined during the 2015 BpS Review.

For LANDFIRE National, this model for MZs 10 and 19 had no peer review. Additional reviewers for MZ21 included Sarah Canham (scanham@fs.fed.us) and Brenda Fiddick (bfiddick@fs.fed.us).

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	B	B	B	UN	UN	UN	UN	UN
Herb	0.5-1.0	A	A	B	B	B	UN	UN	UN	UN	UN
Herb	>1.0	A	A	B	B	B	UN	UN	UN	UN	UN
Shrub	0-0.5	B	B	B	B	B	UN	UN	UN	UN	UN
Shrub	0.5-1.0	B	B	B	B	B	UN	UN	UN	UN	UN
Shrub	1.0-3.0	B	B	B	B	B	UN	UN	UN	UN	UN
Shrub	>3.0	B	B	B	B	B	UN	UN	UN	UN	UN
Tree	0-5	B	B	B	B	B	UN	UN	UN	UN	UN
Tree	5-10	B	B	B	B	B	UN	UN	UN	UN	UN
Tree	10-25	B	B	B	B	B	UN	UN	UN	UN	UN
Tree	25-50	B	B	B	B	B	UN	UN	UN	UN	UN
Tree	>50	B	B	B	B	B	UN	UN	UN	UN	UN

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 5 Early Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
SIAC	Silene acaulis	Moss campion	Upper
TRNA2	Trifolium nanum	Dwarf clover	Upper
FEBR	Festuca brachyphylla	Alpine fescue	Upper

Description

Very exposed (barren) state following disturbance. Rock may dominate the area. Forbs (cushion plants) are more common than grasses.

Maximum Tree Size Class

None

Class B 95 Late Development 1 - Closed

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
SIAC	Silene acaulis	Moss campion	Upper
TRNA2	Trifolium nanum	Dwarf clover	Upper
FEBR	Festuca brachyphylla	Alpine fescue	Upper

Description

Alpine community is dominated by low-growing perennials and some graminoids. Plant cover may vary from 5% to as much as 50%. Infrequent replacement fire in the form of lightning strikes, severe summer drought, and animal disturbance (1/500) cause a transition to Class A.

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Late1:CLS	9
Late1:CLS	10	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
Wind or Weather or Stress	Late1:CLS	Early1:ALL	0.002	500	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.002	500	Yes	0
Optional 1	Late1:CLS	Early1:ALL	0.002	500	Yes	0

Optional Disturbances

Optional 1: Rodent Disturbances

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