

10670

Mediterranean California Alpine Fell-Field

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
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None	None	None	None
None	None	None	None

Vegetation Type

Shrubland

Map Zone

6

Geographic Range

This ecological system occurs in limited alpine environments mostly concentrated in the Sierra Nevada but also on Mount Shasta and as far south as the Peninsular Ranges and White 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,” and these are stone fields. Sites are stable for hundreds to thousands of years as soils develop.

In the Sierra, Alpine elevations begin around 3,500m (10,600ft) in the southern mountain ranges, and 2,700m (8,200ft) in the southern Cascades.

Vegetation Description

Most fell-field plants are cushioned or matted, frequently succulent, flat to the ground in rosettes, and often densely hairy and thickly cutinized. Common species include *Ribes cereum*, *Leptodactylon pungens*, *Ericameria discoidea*, *Castilleja nana*, *Minuartia nuttallii* (= *Arenaria nuttallii*), *Phlox condensata*, *Draba densifolia*, *Oxyria digyna*, and *Aquilegia pubescens*. Plants cover 15-50%; exposed rock makes up the rest. Fell-fields are usually nested within or adjacent to alpine tundra dry meadows.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
RICE	<i>Ribes cereum</i>	Wax currant
LEPU	<i>Leptodactylon pungens</i>	Granite prickly phlox
ERDI14	<i>Ericameria discoidea</i>	Whitestem goldenbush
CANA3	<i>Castilleja nana</i>	Dwarf alpine Indian paintbrush
MINU4	<i>Minuartia nuttallii</i>	Nuttall's sandwort
PHCO11	<i>Phlox condensata</i>	Dwarf phlox
DRDE	<i>Draba densifolia</i>	Denseleaf draba

OXDI3	<i>Oxyria digyna</i>	Alpine mountainsorrel
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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 accumulates can cause infrequent soil slips that expose bare ground.

Very small burns of a few square meters (replacement fire) caused by lightning strikes were included as a rare disturbance, although lightning storms are frequent at those elevations. The calculation of lightning strike frequency was not based on fire return intervals, but on the number of strikes (in this case, five) per 1,000 possible locations per year – thus, 0.005.

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	523	100		
Moderate (Mixed)				
Low (Surface)				
All Fires	523	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 fuels and extensive barren areas acting as fire breaks.

Adjacency or Identification Concerns

Over 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.

Issues or Problems

No data on fire or effects of lightning strikes. No data on recovery time after stand-replacing events. This model had no peer review. Species were derived from literature review. Moss Campion flowers at 10yrs.

Native Uncharacteristic Conditions

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

Comments

John Foster modified species and geographic range to reflect BpS 061067, Sierra Nevada Alpine Fell-Field.

Quality control resulted in slightly changed canopy cover values (Class A changed from 0-5% to 0-20%; Class B changed from 6-50% to 20-60%) to adhere to LANDFIRE mapping requirements.

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
RICE	Ribes cereum	Wax currant	Upper
LEPU	Leptodactylon pungens	Granite prickly phlox	Upper
ERDI14	Ericameria discoidea	Whitestem goldenbush	Upper
CANA3	Castilleja nana	Dwarf alpine Indian paintbrush	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
RICE	Ribes cereum	Wax currant	Upper
LEPU	Leptodactylon pungens	Granite prickly phlox	Upper
ERDI14	Ericameria discoidea	Whitestem goldenbush	Upper
CANA3	Castilleja nana	Dwarf alpine Indian paintbrush	Upper

Description

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

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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