

11360

Mediterranean California Alpine Dry Tundra

BpS Model/Description Version: Aug. 2020

Modelers		Reviewers	
Louis Provencher	lprovencher@tnc.org	None	None
None	None	None	None
None	None	None	None

Vegetation Type

Herbaceous

Map Zone

6

Geographic Range

These dry meadows typically occur in the northern Sierra Nevada, Klamath Mountains, and Cascade Mountains.

Biophysical Site Description

The alpine belt is above timberline (approximately >3,200 m) and below the permanent snow level (<4,500 m). These meadows are typically found on gentle-to-steep slopes, flat ridges, and upper basins where the soil is thin and the water supply is constant and strongly regulated by snowpatch patterns. These sites are generally very well drained and xeric after the snow melts.

Vegetation Description

The system is commonly comprised of a mosaic of small-patch plant communities that are dominated by sedges, grasses, and forbs. Characteristic species include *Phlox diffusa*, *Phlox covillei*, *Erigeron pygmaeus*, *Podistera nevadensis*, *Carex congdonii*, *Calamagrostis purpurascens*, *Eriogonum incanum*, *Raillardiopsis muirii* (=Raillardella muirii), *Castilleja nana*, *Erigeron compositus*, *Eriogonum ovalifolium*, *Eriogonum gracilipes*, etc. There is a rocky mesic version of this system with *Hulsea algida*, *Saxifraga tolmiei*, *Carex helleri*, *Ranunculus eschscholtzii*, *Polemonium eximium*, *Salix reticulata* (rarely), *Oxyria digyna*, *Sibbaldia procumbens*, etc., that can be found near snowmelt patches generally on sheltered, steep, rocky slopes.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
PHDI3	<i>Phlox diffusa</i>	Spreading phlox
PHCO12	<i>Phlox covillei</i>	Coville's phlox
ERPY	<i>Erigeron pygmaeus</i>	Pygmy fleabane
PONE4	<i>Podistera nevadensis</i>	Nevada podistera
CACO12	<i>Carex congdonii</i>	Congdon's sedge
CAPU	<i>Calamagrostis purpurascens</i>	Purple reedgrass
ERIN9	<i>Eriogonum incanum</i>	Frosted buckwheat
RAMU3	<i>Raillardiopsis muirii</i>	Muir's raillardiopsis

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 favor grasses over forbs, whereas wet summers cause a more diverse mixture of forbs and graminoids.

Avalanches on steeper slopes where soil accumulated can cause infrequent soil slips, which 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.

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	210	100		
Moderate (Mixed)				
Low (Surface)				
All Fires	210	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

Alpine dry tundra typically inter-mingles with alpine bedrock and scree, ice field, fell-field, alpine dwarf-shrubland, and alpine/subalpine wet meadows.

Several experts claim that the alpine is one of the community types more threatened by global climate change in the decades to come. 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.

Native Uncharacteristic Conditions

Comments - none

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	B	B	B	B	B
Herb	0.5-1.0	A	A	B	B	B	B	B	B	B	B
Herb	>1.0	A	A	B	B	B	B	B	B	B	B
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	3	Early Development 1 - All Structures
----------------	----------	---

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CAREX	Carex	Sedge	Upper
DECA18	Deschampsia caespitosa	Tufted hairgrass	Upper
FEBR	Festuca brachyphylla	Alpine fescue	Upper

Description

Very exposed (barren) state following a lightning strike. Soil (not rock) may dominate the area. Grasses are more common than forbs.

Structural classes originally input as 0-10% herbaceous. However, due to mapping rules, changed to 0-20%.

Maximum Tree Size Class

None

Class B	97	Late Development 1 - Closed
----------------	-----------	------------------------------------

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
CAREX	Carex	Sedge	Upper
DECA18	Deschampsia caespitosa	Tufted hairgrass	Upper
ARAR9	Artemisia arctica	Boreal sagebrush	Upper

Description

Alpine community is dominated by graminoids, herbaceous perennials, and few low-growing shrubs. Plant cover may vary from 2% on exposed sites to as much as 25% on mesic and more protected sites. Infrequent replacement fire in the form of lightning strikes, severe summer droughts, and rare avalanches on steeper slopes with soil (1/1,000).

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
Early1:ALL	0	Late1:CLS	2
Late1:CLS	3	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
Optional 1	Late1:CLS	Early1:ALL	0.001	1000	Yes	0
Replacement Fire	Late1:CLS	Early1:ALL	0.005	200	Yes	0
Wind or Weather or Stress	Late1:CLS	Early1:ALL	0.01	100	Yes	0

Optional Disturbances

Optional 1: Avalanches

References

Baker, W.L. 1980. Alpine vegetation of the Sangre De Cristo Mountains, New Mexico: Gradient analysis and classification. Unpublished thesis. Chapel Hill, NC: University of North Carolina. 55 pp.

Bamberg, S.A. 1961. Plant ecology of alpine tundra area in Montana and adjacent Wyoming. Unpublished dissertation. Boulder, CO: University of Colorado. 163 pp.

Bamberg, S.A. and J. Major. 1968. Ecology of the vegetation and soils associated with calcareous parent materials in three alpine regions of Montana. *Ecological Monographs* 38(2): 127-167.

Cooper, S.V., P. Lesica, and D. Page-Dumroese. 1997. Plant community classification for alpine vegetation on Beaverhead National Forest, Montana. Report INT-GTR-362. Ogden, UT: USDA Forest Service, Intermountain Research Station. 61 pp.

Komarkova, V. 1976. Alpine vegetation of the Indian Peaks Area, Front Range, Colorado Rocky Mountains. Unpublished dissertation. Boulder, CO: University of Colorado. 655 pp.

Komarkova, V. 1980. Classification and ordination in the Indian Peaks area, Colorado Rocky Mountains. *Vegetation* 42: 149-163.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

Schwan, H.E. and D.F. Costello. 1951. The Rocky Mountain alpine type: Range conditions, trends and land use (a preliminary report). Unpublished report prepared for USDA Forest Service, Rocky Mountain Region (R2), Denver, CO. 18 pp.

Thilenius, J.F. 1975. Alpine range management in the western United States--principles, practices, and problems: The status of our knowledge. USDA Forest Service Research Paper RM-157. Fort Collins, CO: Rocky Mountain Forest and Range Experiment Station. 32 pp.

Willard, B.E. 1963. Phytosociology of the alpine tundra of Trail Ridge, Rocky Mountain National Park, Colorado. Unpublished dissertation. Boulder, CO: University of Colorado.