USDA Natural Resources Conservation Service

Ecological site R222XY352AK
Alpine Dwarf Scrub Dry Organic Slopes

Last updated: 6/20/2019
Accessed: 05/19/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 222X–Southern Alaska Coastal Mountains

The Southern Alaska Coastal Mountains (MLRA 222) encompasses the Pacific Border Ranges and Coast Mountains physiographic provinces (Wahrhaftig 1965). Spanning approximately 26,355 square miles, the elevation ranges from sea level at the base of glaciers and ice fields to 18,008 feet at Mt. St. Elias. The MLRA was covered by glacial ice during the Pleistocene epoch, a time period spanning from 2.6 million to 11,700 years ago. During interglacial periods glacial extent was reduced, leaving behind various glacial deposits. Over time these deposits have been eroded or buried by colluvium and slope alluvium, which now covers more than 90 percent of the unglaciated landscape. Paleozoic, Mesozoic, and Lower Tertiary stratified sedimentary rocks, and occasionally Paleozoic intrusive rocks, underlie much of the area and are exposed on steep mountain slopes and ridges (USDA-NRCS 2006).

This landscape lies in the true alpine zone where glacial ice is, and has been, the dominant ground cover. Glacial ice encompassed all the MLRA during the Late Wisconsinan glaciation, 25,000 – 21, 000 years ago (Kauffman et al. 2011). Changes in climatic conditions following this period resulted in the recession of some glaciers and slowly exposed new surfaces for inhabitation by terrestrial ecosystems. Pioneer plant communities began to establish on the new substrate within the first 30 years and consisted mostly of evergreen, herbaceous dwarf shrubs with some pockets of low shrubs. These communities quickly transitioned to tall shrubs within 100 years of deglaciation. By approximately 13,000 years ago, four stable plant communities emerged across the non-glaciated landscape –

ericaceous dwarf shrub, low shrub, tall shrub, and herbaceous communities – and form the present-day ecosystems (Boggs et al. 2010).

Classification relationships

USFS Ecoregion Province: Marine Mountains (M240), Forest-Meadow High (M242b) (Bailey 2007)

U.S. EPA Level III Ecoregion: Pacific Coastal Mountains (119) (Gallant et al. 2010)

National Vegetation Classification – Ecological Systems: Alaskan Pacific Maritime Alpine Dwarf Shrubland (CES204.310) (NatureServe 2015)

Biophysical Settings: Alaskan Pacific Maritime Herbaceous Dwarf Shrubland (BpS 7816430) (LANDFIRE 2009)

Alaska Natural Heritage Program Landcover Class: Dwarf Shrub (Boggs et al. 2016)

Alaskan Vegetation Classification: Crowberry Dwarf Shrub Tundra (Viereck et al. 1992)

Ecological site concept

Alpine Dwarf Scrub Organic Slopes ecological sites occur on high-elevation mountain slopes that are exposed to harsh climatic conditions. The soils are Histisols that are well-drained and shallow, formed in organic material over weathered residuum.

The reference vegetation on this ecological site is defined by a mixed dwarf scrub-lichen community. Black crowberry (Empetrum nigrum L.) and bog blueberry (Vaccinium uliginosum (Hook.) Coville) are the dominant dwarf shrubs, and star reindeer lichen (Cladina stellaris (Opiz) Brodo) and greygreen reindeer lichen (Cladina rangiferina (L.) Nyl.) are the dominant lichen. Continuous exposure to cold temperatures, wind, and a short growing season maintain this plant community (LANDFIRE 2009).

Associated sites

R222XY356AK	**Alpine Dwarf Scrub Dry Gravelly Slopes** Mineral soils that are shallow to bedrock
R222XY357AK	**Alpine Dwarf Scrub Moist Gravelly Slopes** Mineral soils that are shallow to bedrock, occurring on concave slope shapes

Similar sites

R222XY356AK	**Alpine Dwarf Scrub Dry Gravelly Slopes** Supports a similar dwarf shrub-lichen community but bedrock is prominent
R222XY357AK	**Alpine Dwarf Scrub Moist Gravelly Slopes** Supports a similar dwarf shrub community but lichen cover is not as dominant

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Empetrum nigrum* (2) *Vaccinium uliginosum*
Herbaceous	(1) *Cladina* (2) *Cladina*

Physiographic features

Alpine Dwarf Scrub Organic Slopes ecological sites occur on alpine mountain slopes. They are situated on elevations ranging from approximately 1000 to 5200 feet ASL. The site does not experience flooding, but rather generates runoff to adjacent, downslope ecological sites.

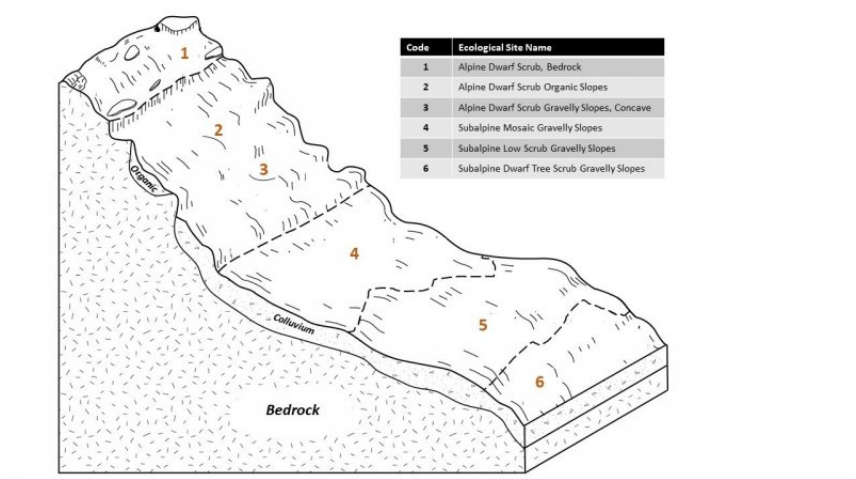


Figure 2. Representative block diagram of Alpine Dwarf Scrub Organic Slopes and associated ecological sites.

Table 2. Representative physiographic features

Geomorphic position, mountains	(1) Upper third of mountainflank
Landforms	(1) Mountains
Elevation	305–1,585 m
Slope	50–100%
Water table depth	203 cm
Aspect	Aspect is not a significant factor

Climatic features

Climate data and analyses are derived from 30-year averages gathered from National Oceanic and Atmospheric Administration (NOAA) weather stations contained within the range of an ecological site. However, no weather stations are available for this ecological site. The following information is a general climate description of the MLRA.

The Southern Alaska Coastal Mountains falls into two Köppen-Geiger climate classifications (Peel et al. 2007): tundra climate (ET) dominates the majority of the MLRA with small portions falling into the subarctic with cool summers and year around rainfall climate (Dfc). In the tundra climate, average temperatures are below 50°F for all months of the year, while the subarctic climate can experience highs above 50°F. Precipitation does not differ significantly across the seasons, but due to the high latitude environment solar radiation extremes occur with seasonal variability. The soil temperature regime of MLRA 222 is classified as cryic, where the mean annual soil temperature is between 32°F and 46°F (USDA-NRCS 2006).

Temperature and precipitation are affected by latitude, elevation, and proximity to maritime or continental zones. The average annual temperature and length of freeze-free period are not known. At the higher elevations, freezing temperatures are likely to occur during any month of the year. Most of the precipitation occurs as snowfall with rainfall increasing in importance in the southeast. Average annual precipitation is 120 to 200 inches but can be 250 inches or more at the highest elevations. Average annual snowfall ranges from about 200 to 800 inches. The snowfall greatly exceeds the annual snowmelt in many places, as evidenced by the abundance and extent of glaciers and ice fields (USDA-NRCS 2006).

Influencing water features

Alpine Dwarf Scrub Organic Slopes ecological sites are not influenced by wetland or riparian water features. Precipitation is the main source of water for this ecological site. Infiltration is very slow (Hydrologic Group D), and surface runoff is high. Surface runoff contributes some water to downslope ecological sites.

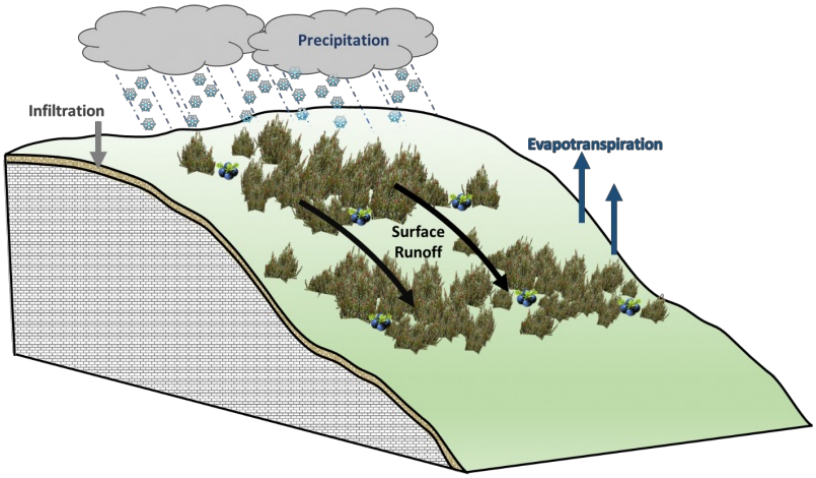


Figure 3. Hydrologic cycling in Alpine Dwarf Scrub Organic Slopes ecological site.

Soil features

Soils of this ecological site are in the Histosols order, further classified as Lithic Cryofolists with very slow infiltration and high runoff potential. The soil series associated with this site includes D22-Subalpine Scrub Organic Slopes. The parent material is organic material over weathered residuum, and the soils are well-drained and shallow. Soil pH classes are extremely acid to neutral. A shallow depth to bedrock is noted as a rooting restriction for the soils of this ecological site.

Table 3. Representative soil features

Parent material	(1) Colluvium
Drainage class	Well drained
Depth to restrictive layer	20 cm
Soil depth	20 cm
Surface fragment cover >3"	0–7%
Available water capacity (Depth not specified)	2.54 cm
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Soil reaction (1:1 water) (Depth not specified)	3.7–6.6
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–35%

Ecological dynamics

The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on historical data, current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

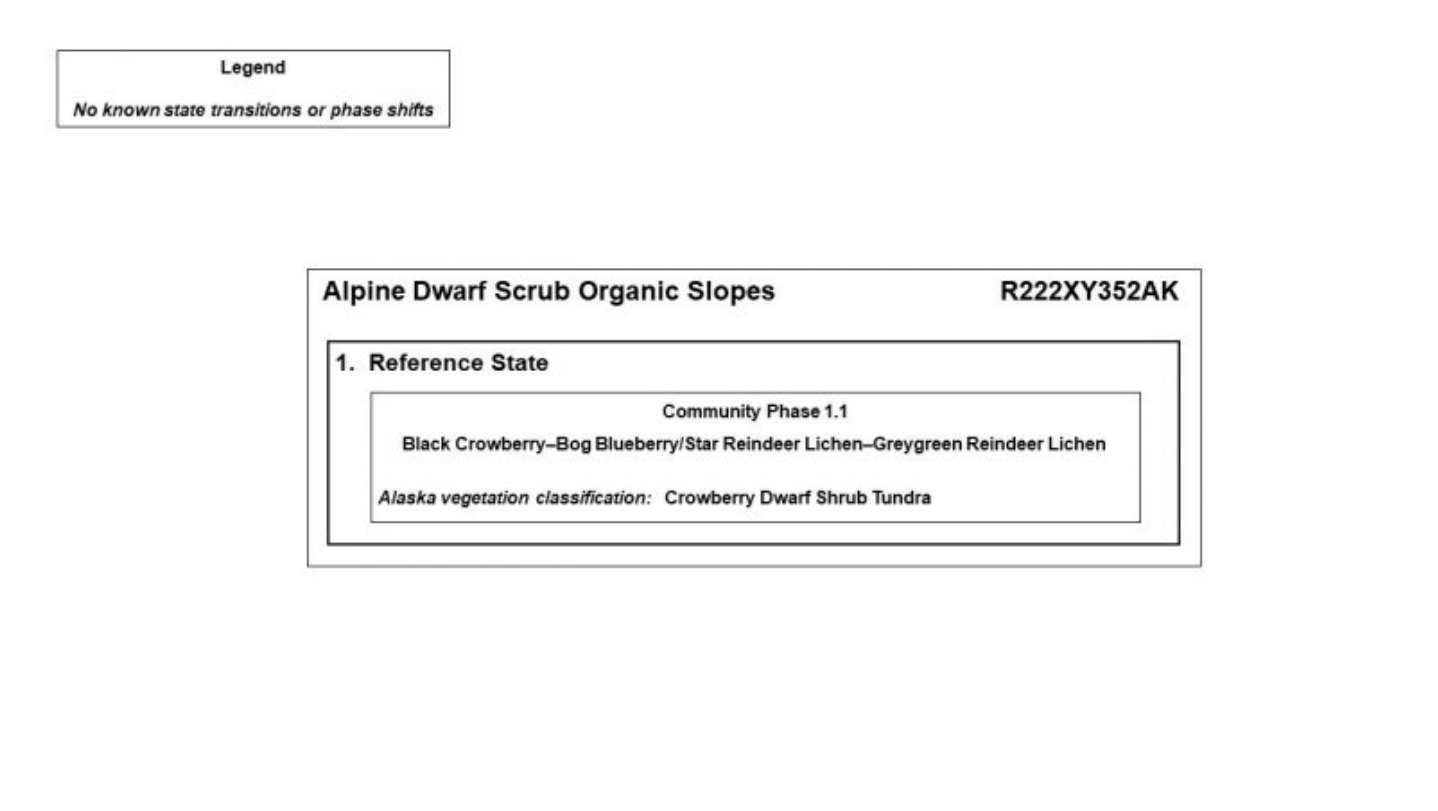
The MLRA lies within the true alpine zone where glaciers are the dominant land cover. The non-glaciated areas are inhabited by a vegetative matrix resulting from a complex interaction among elevation, varying microclimates resulting from landscape topography, and natural disturbance regimes. The result is a heterogeneous landscape of ericaceous dwarf shrubs, low shrubs, and tall shrubs. Alpine Dwarf Scrub Organic Slopes ecological sites form an aspect of this vegetative continuum. This ecological site occurs on linear to convex mountain backslopes on well-

drained organic soils. Species characteristic of this ecological site consist of a mix of dwarf ericaceous shrubs and lichen.

Located in the alpine life zone, the Alpine Dwarf Scrub Organic Slopes ecological site is exposed to a variety of harsh environmental conditions that drive and maintain the plant community. It is typically under snow for most of the year leaving a short season for plants to grow and reproduce. When the site is snow-free, cold temperatures and high winds in exposed positions further contribute to inhibited plant growth and performance.

The state-and-transition model that follows provides a detailed description of each state, community phase, pathway, and transition. This model is based on available experimental research, field observations, literature reviews, professional consensus, and interpretations.

State and transition model



State 1
STATE 1 - REFERENCE STATE

The reference plant community is categorized as a mixed dwarf scrub-lichen community. The one community phase within the reference state is maintained by exposure to cold temperatures, wind, and a short growing season.

Community 1.1
Black crowberry-Bog blueberry/Star reindeer lichen-Greygreen reindeer lichen

Figure 4. Alpine Dwarf Scrub Organic Slopes ecological site at Skagway-Klondike Gold Rush National Historical Park.

The community is characterized by mixed dwarf scrub and lichen. Average dwarf shrub cover is 50 percent. Common dwarf shrub species include black crowberry and bog blueberry with a smaller portion of beauverd spirea (*Spiraea stevenii* (C.K. Schneid.) Rydb.), yellow mountainheath (*Phyllodoce glanduliflora* (Hook.) Coville), western moss heather (*Cassiope mertensiana* (Bong.) G. Don), strawberryleaf raspberry (*Rubus pedatus* Sm.), Alaska bellheather (*Harrimanella stelleriana* (Pall.) Coville), lingonberry (*Vaccinium vitis-idaea* L.), and least willow (*Salix rotundifolia* Trautv.). Average lichen cover is 45 to 50 percent. Star reindeer lichen and greygreen reindeer lichen are the dominant lichen species with a smaller proportion of reindeer lichen (*Cladina portentosa* (Dufour) Follmann), cup lichen (Cladonia P. Browne), beard lichen (Usnea Dill. ex Adans.), and felt lichen (Peltigera Willd.). Stunted Sitka spruce (*Picea sitchensis* (Bong.) Carrière) makes up less than 5 percent cover. Trace graminoid and forb cover has been observed.

Additional community tables

Animal community

Vegetation in this ecological site does not seem to be commonly browsed and grazed as few of the ericaceous dwarf shrubs are palatable. However, while the site may not be an important foraging ground for wildlife, game trails may be abundant. Large mammals, such as Sitka deer (Odocoileus hemionus sitkensis), mountain goats (Oreamnos americanus), bears (Ursus sp.), wolves (Canis lupus), and wolverines (Gulo gulo), are known to utilize the associated mountain ridges of this site for migration and hunting. A limited number of bird species – e.g., rock ptarmigran (Lagopus mutus) and American pipit (Anthus rubescens) – can successfully nest in this harsh environment (Carsten 2007).

Inventory data references

Tier 2 sampling plots used to develop the reference state, community phase 1.1:

Skagway-Klondike Gold Rush National Historical Park (National Park Service), Skagway, Alaska

Other references

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Peel, M.C., B.L. Finlayson, and T.A. McMahon. 2007. Updated world map of the Köppen-Geiger climate classification. Hydrology and Earth System Sciences 11: 1633-1644.

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Wahrhaftig, C. 1965. Physiographic Divisions of Alaska. Geological Survey Professional paper 482. U.S. Department of the Interior, Geological Survey, U.S. Government Printing Office, Washington, DC. 52 pps.

Approval

Michael Margo, 6/20/2019

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**