USDA Natural Resources Conservation Service

Ecological site R220XY358AK
Subalpine Scrub Gravelly Dry 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.

MLRA notes

Major Land Resource Area (MLRA): 220X–Alexander Archipelago-Gulf of Alaska Coast

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 Mesic Herbaceous Meadow (CES204.163), Alaskan Pacific Maritime Alder-Salmonberry Shrubland (CES204.152) (NatureServe 2015)

Biophysical Settings: Alaskan Pacific Maritime Mesic Herbaceous Meadow (BpS 7816530), Alaskan Pacific Maritime Subalpine Alder-Salmonberry Shrubland (BpS 7816520) (LANDFIRE 2009)

Alaska Natural Heritage Program Landcover Class: Herbaceous (Mesic): Alpine and Subalpine Mesic Herbaceous, Low-Tall Shrub: Alder-Salmonberry (Boggs et al. 2016)

Alaskan Vegetation Classification: Mesic Sedge-Grass Meadow Tundra, Mesic Sedge-Herb Meadow Tundra, Closed Tall Alder Shrub (Viereck et al. 1992)

Ecological site concept

Subalpine Mosaic Gravelly Slopes ecological sites occur on subalpine mountain slopes on creep landforms (Boggs et al. 2016). The soils are well-drained, shallow, and stony, formed in colluvium, residuum, or glacial till (Viereck et al. 1992; Boggs et al. 2008; LANDFIRE 2009; Boggs et al. 2016; NatureServe 2018).

The reference vegetation on this ecological site is defined by a mosaic of tall shrubs and herbaceous vegetation. The tall shrub component of the mosaic is primarily composed of Sitka alder (Alnus viridis (Chaix) DC. ssp. sinuata (Regel) Á. Löve & D. Löve) and salmonberry (Rubus spectabilis Pursh). The herbaceous meadow component is very diverse, with no single dominant species. Commonly reported species include beauverd spiraea (Spiraea stevenii (C.K. Schneid.) Rydb.), spreading woodfern (Dryopteris expansa (C. Presl) Fraser-Jenkins & Jermy), and bluejoint (Calamagrostis canadensis (Michx.) P. Beauv.) (Viereck et al. 1992; Boggs et al 2016). Snow avalanche, freeze-thaw action, and soil creep are the primary disturbance regimes of Subalpine Mosaic Gravelly Slopes (LANDFIRE 2009; Boggs et al. 2016).

Associated sites

R222XY352AK	**Alpine Dwarf Scrub Dry Organic Slopes** Located higher on the landscape on organic soils
R222XY357AK	**Alpine Dwarf Scrub Moist Gravelly Slopes** Located higher on the landscape
F220XY205AK	**Subalpine Woodlands Gravelly Moist Slopes** Located lower on the landscape
F220XY350AK	**Subalpine Woodlands Gravelly Dry Slopes** Located lower on the landscape

Similar sites

F220XY205AK	**Subalpine Woodlands Gravelly Moist Slopes** Similar Sitka alder dominance but this site is located on avalanche chutes
R220XY361AK	**Subalpine Shrub Dry Flood Plain** Similar Sitka alder dominance but this site is located on high-elevation floodplains

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Alnus viridis ssp. sinuata* (2) *Rubus spectabilis*
Herbaceous	(1) *Dryopteris expansa* (2) *Calamagrostis canadensis*

Physiographic features

Subalpine Mosaic Gravelly Slopes ecological sites occur on subalpine mountain slopes on creep landforms. They are reported from 1900 to 3000 feet ASL (DeVelice et al. 1999; Boggs et al. 2008). The site does not experience flooding, but rather generates runoff to adjacent, downslope ecological sites.

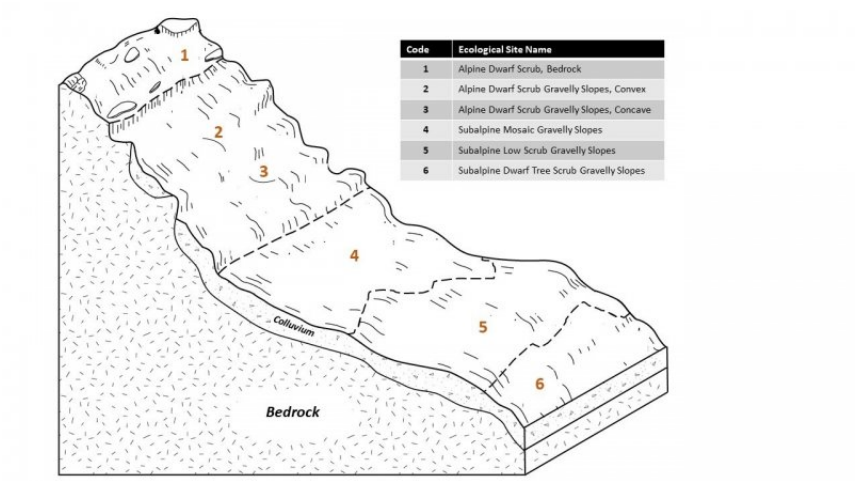


Figure 1. Representative block diagram of Subalpine Mosaic Gravelly Slopes and associated ecological sites.

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

Subalpine Mosaic Gravelly 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 likely very slow (Hydrologic Group D), and surface runoff is high. Surface runoff contributes some water to downslope ecological sites.

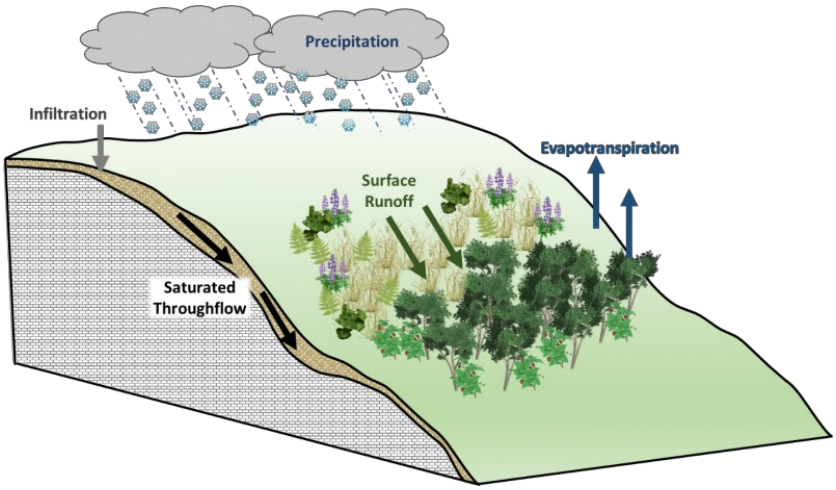


Figure 2. Hydrologic cycling in Subalpine Mosaic Gravelly Slopes ecological site.

Soil features

No soil survey data is currently available for this ecological site. The following is a general description based on a review of the scientific literature.

Soils of this ecological site are shallow, gravelly loams formed in colluvium, residuum, or glacial till. A thin organic or litter layer may be present. The soils are well-drained and very strongly acid to slightly alkaline. (Viereck et al. 1992; Boggs et al. 2008; Boggs et al. 2016).

Ecological dynamics

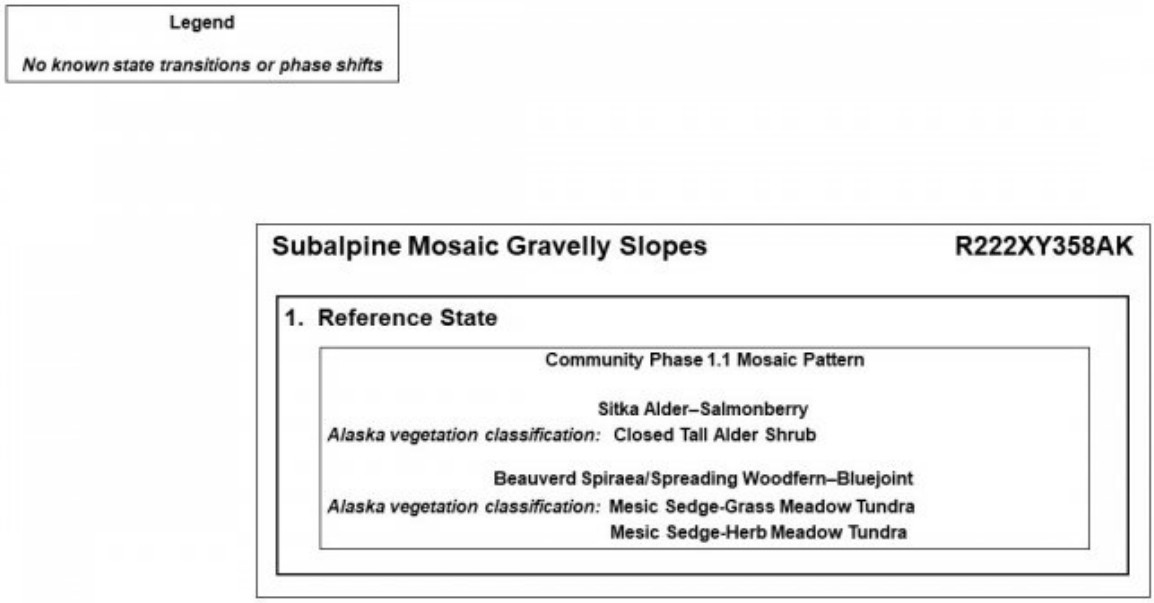
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on historical data, current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. 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. Subalpine Mosaic Gravelly Slopes ecological sites form an aspect of this vegetative continuum. This ecological site occurs on mountain backslopes on creep landforms. A mosaic of tall shrubs and herbaceous meadows is the characteristic vegetation of this ecological site.

Snow avalanches, freeze-thaw action, and soil creep are the primary disturbance regimes of Subalpine Mosaic Gravelly Slopes. Avalanches increase plant diversity by creating ecological niches (Rixen et al. 2007). Freeze-thaw action causes the disruption and dislocation of soil horizons, the displacement and incorporation of materials from other horizons, and mechanically sorts soil particles resulting in soil creep (Poulenard and Podwojewski 2004). This slow, but near-constant soil disturbance promotes inhabitation by plant species tolerant of such environmental conditions.

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 mosaic tall shrub-herbaceous plant community. The one community phase within the reference state is maintained by avalanches, soil creep, and freeze-thaw action.

Community 1.1
Sitka alder-Salmonberry:Beauverd spiraea/Spreading woodfern-Bluejoint mosaic

Figure 3. Herbaceous meadow component of Subalpine Mosaic Gravelly Slopes ecological site at Glacier Bay National Park and Preserve (Boggs et al. 2008).

The community is characterized by a shrub-herb mosaicked community. Sitka alder and salmonberry are the dominant species associated with the tall shrub component, but other common species include red elderberry (*Sambucus racemosa* L.) and copperbush (*Elliottia pyroliflora* (Bong.) S.W. Brim & P.F. Stevens) (Viereck et al. 1992; Bogg et al. 2016; NatureServe 2018). The herbaceous component is highly diverse, with no dominance by a single species. Representative graminoids include bluejoint, longawn sedge (*Carex macrochaeta* C.A. Mey.), and smallawned sedge (*Carex macrochaeta* T. Holm). Spreading woodfern, woolly geranium (*Geranium erianthum* DC.), Canadian burnet (*Sanguisorba canadensis* L.), arrowleaf ragwort (*Senecio triangularis* Hook.), deercabbage

(*Nephrophyllidium crista-galli* (Menzies ex Hook.) Gilg), Alaskan Indian paintbrush (*Castilleja unalaschcensis* (Cham. & Schltdl.) Malte), and Nootka lupine (*Lupinus nootkatensis* Donn ex Sims) are some common forbs of the meadow component (Viereck et al. 1992; DeVelice et al. 1999; Boggs et al. 2008; Boggs et al. 2016; NatureServe 2018).

Additional community tables

Animal community

The subalpine parkland zone of MLRA 222 provides desirable habitat opportunities for many wildlife species. The matrix of herbaceous meadows, low and tall shrubs, and small stands of stunted trees offer foraging opportunities and thermal and protective cover. Herbivores – such as Sitka deer (Odocoileus hemionus sitkensis), mountain goats (Oreamnos americanus), and hoary marmot (Marmota calligata) – readily graze the herbaceous meadows. Grouse (Dendragapus spp.) and ptarmigan (Lagopus spp.) utilize these meadows and low shrub communities for hunting insects. A small portion of bears (Ursus sp.), mostly sows with cubs, forage in this zone throughout the summer. Lastly, various songbirds will utilize the tall shrubs and stunted trees for nesting cover (Carsten 2007).

Inventory data references

No field plots were available for this site. A review of the scientific literature and professional experience were used to approximate the plant communities for this provisional ecological site. Information for the state-and-transition model was obtained from the same sources. All community phases are considered provisional based on these plots and the sources identified in ecological site description.

Other references

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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:**

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

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

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

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

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

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

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

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

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

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):**

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

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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:**

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17. **Perennial plant reproductive capability:**
