Ecological site R220XY349AK
Subalpine Scrub Gravelly Dry Chutes

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

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): 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 Alder-Salmonberry Shrubland (CES204.152) (NatureServe 2015)

Biophysical Settings: Alaskan Pacific Maritime Alder-Salmonberry Shrubland (BpS 7816520) (LANDFIRE 2009)

Alaska Natural Heritage Program Landcover Class: Low-Tall Shrub: Alder-Salmonberry (Boggs et al. 2016)

Alaskan Vegetation Classification: Tall Alder Scrub (Viereck et al. 1992)

Ecological site concept

Subalpine Tall Scrub Gravelly Avalanche Chutes ecological sites occur at the outflow of avalanche chutes in the subalpine life zone. The soils are gravelly Inceptisols that are well-drained and shallow, formed in colluvium over weathered residuum.

The reference vegetation on this ecological site is defined by tall and dwarf shrubs. Sitka alder (Alnus viridis (Chaix) DC. ssp. sinuata Regel) is the dominant tall shrub on the site, and Aleutian mountainheath (Phyllodoce aleutica (Spreng.) A. Heller) and western moss heather (Cassiope mertensiana (Bong.) G. Don) are the dominant dwarf shrubs (Boggs et al. 2008). The primary disturbance process that maintains this community is downward movement of snow and debris from avalanches.

Associated sites

F220XY350AK	**Subalpine Woodlands Gravelly Dry Slopes** Site occurs adjacent to or directly below R222XY349AK on stabilized, concave slope shapes
R220XY358AK	**Subalpine Scrub Gravelly Dry Slopes** Site occurs adjacent to R222XY349AK on soil creep landforms
F220XY205AK	**Subalpine Woodlands Gravelly Moist Slopes** Site occurs adjacent to or directly below R222XY349AK on stabilized, concave slope shapes

Similar sites

R220XY361AK	**Subalpine Shrub Dry Flood Plain** Supports a similar plant community but occurs on high-elevation drainageways

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Alnus viridis ssp. sinuata*
Herbaceous	(1) *Phyllodoce aleutica* (2) *Cassiope mertensiana*

Physiographic features

Subalpine Tall Scrub Gravelly Avalanche Chutes ecological sites occur at the outflow of avalanche chutes. They are situated on elevations ranging from approximately 1000 to 5200 feet. The site does not experience flooding, but rather generates runoff to adjacent, downslope ecological sites.

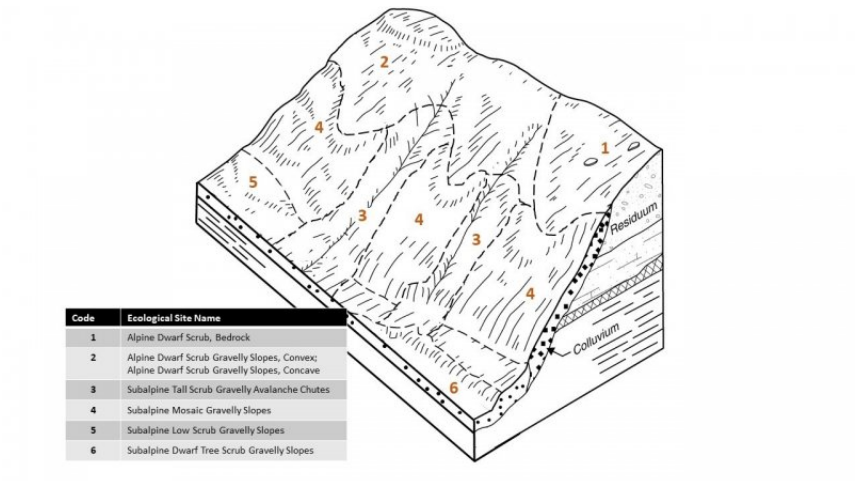


Figure 2. Representative block diagram of Subalpine Tall Scrub Gravelly

Avalanche Chutes and associated ecological sites.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Avalanche chute
Elevation	305–1,585 m
Slope	5–70%
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

Subalpine Tall Scrub Gravelly Avalanche Chutes 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. Similar to drainageways, avalanche chutes accumulate surface runoff and delivers water downslope. Surface runoff contributes some water to downslope ecological sites.

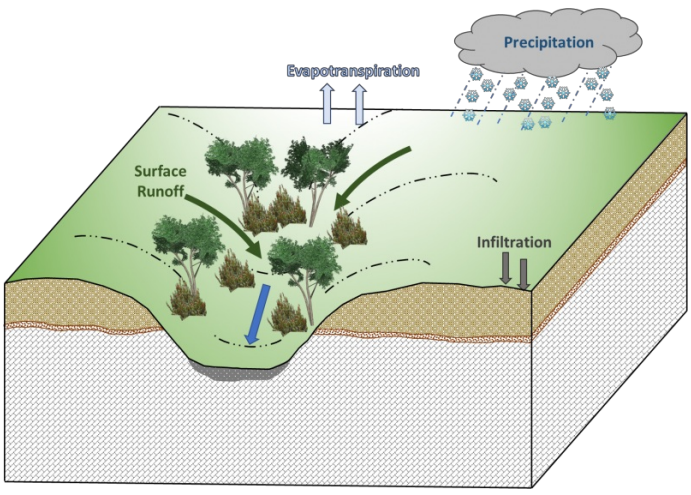


Figure 3. Hydrologic cycling in Subalpine Tall Scrub Gravelly Avalanche Chutes ecological site.

Soil features

Soils of this ecological site are in the Inceptisols order, further classified as Lithic Humicryepts with very slow infiltration and high runoff potential. The soil series associated with this site includes D22-Subalpine Scrub Gravelly Slopes, Depositional. The parent material is gravelly colluvium over weathered residuum, and the soils are well-drained and shallow. Soil pH classes are very strongly acid to moderately acid. A shallow to moderate depth to bedrock is noted as a rooting restriction for the soils of this ecological site.

Figure 4. Profile of soil series associated with Subalpine Tall Scrub Gravelly Avalanche Chutes.

Table 3. Representative soil features

Parent material	(1) Colluvium
Drainage class	Well drained
Depth to restrictive layer	38 cm
Soil depth	38 cm
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0–3%
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)	4.5–6
Subsurface fragment volume <=3" (Depth not specified)	0–30%
Subsurface fragment volume >3" (Depth not specified)	0–20%

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.

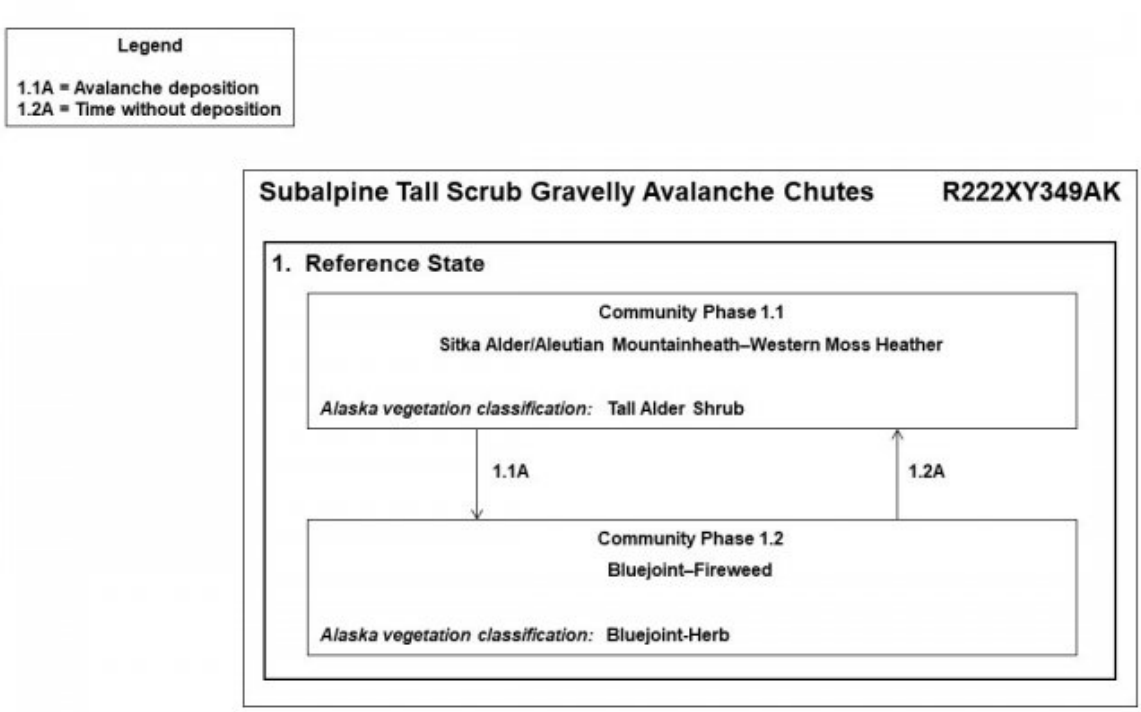
The MLRA lies within the true alpine zone where glaciers are the dominant land cover. The non-glaciated areas are inhabited by a vegetative matrix resulting from a complex interaction among elevation, varying microclimates resulting from landscape topography, and natural disturbance regimes. The result is a heterogeneous landscape of

ericaceous dwarf shrubs, low shrubs, and tall shrubs. Subalpine Tall Scrub Gravelly Avalanche Chutes ecological sites form an aspect of this vegetative continuum. This ecological site occurs on the outflow of avalanche chutes on well-drained soils. Species characteristic of this ecological site consist of tall and dwarf shrubs.

The primary disturbance factor of Subalpine Tall Scrub Gravelly Avalanche Chutes ecological sites is the downward movement of snow and debris from avalanches. Avalanches increase plant diversity by creating ecological niches. These ecological niches support different successional stages and age classes which promotes habitat complexity and landscape heterogeneity (Rixen et al. 2007).

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 shrub-herb community, dominated by tall and dwarf shrubs. Deposition from avalanches is the primary disturbance factor that drives the two community phases within the reference state.

Community 1.1
Sitka alder/Aleutian mountainheath-Western moss heather

This community phase represents a mid sere plant community following disturbance from the downward movement of snow and debris. The plant community is characterized by a mixture of tall and dwarf shrubs with an understory of graminoids and forbs. Medium-sized shrub species include Sitka alder, marsh Labrador tea (*Ledum palustre* L. ssp. decumbens (Aiton) Hultén), and Barclay's willow (*Salix barclayi* Andersson). Dwarf shrub species include Aleutian mountainheath, western moss heather, black crowberry (*Empetrum nigrum* L.), oval-leaf willow (*Salix ovalifolia* Trautv.), and alpine azalea (*Loiseleuria procumbens* (L.) Desv.). Bluejoint (*Calamagrostis canadensis* (Michx.) P. Beauv.) and longawn sedge (*Carex macrochaeta* C.A. Mey) are the dominant graminoids. This community supports a diversity of forb species such as western oakfern (*Gymnocarpium dryopteris* (L.) Newman), common ladyfern (*Athyrium filix-femina* (L.) Roth), curled starwort (*Stellaria crispa* Cham. & Schltdl.), claspleaf twistedstalk (*Streptopus amplexifolius* (L.) DC.), spreading woodfern (*Dryopteris expansa* (C. Presl) Fraser-Jenkins & Jermy), and fireweed (*Chamerion angustifolium* (L.) Holub).

Community 1.2
Bluejoint-Fireweed

This community phase represents an early sere plant community following slope erosion. The community is characterized by a mixture of graminoid species – such as bluejoint and longawn sedge – and forb species – such as fireweed, white false hellebore (*Veratrum album* L.), Sitka valerian (*Valeriana sitchensis* Bong.), arctic lupine (*Lupinus arcticus* S. Watson), and common cowparsnip (*Heracleum maximum* W. Batram). Snow creep in some areas may maintain this community phase for extended periods.

Pathway 1.1A
Community 1.1 to 1.2

Sitka alder/Aleutian mountainheath-Western moss heather

Bluejoint-Fireweed

The downward movement of snow and debris erodes the hillslope. The resulting deposition either covers or obliterates the existing vegetation.

Pathway 1.2A
Community 1.2 to 1.1

Bluejoint-Fireweed

Sitka alder/Aleutian mountainheath-Western moss heather

Time since slope deposition.

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

Tier 2 sampling plots used to develop the reference state, community phase 1.1 and 1.2:

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Viereck, L.A., C.T. Dyrness, A.R. Batten, and K.J. Wenzlick. 1992. The Alaska Vegetation Classification. General Technical Report PNW-GTR-286. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 278 pps.

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:

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

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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:**
