

# **Ecological site R220XY361AK**

## **Subalpine Shrub Dry Flood Plain**

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### **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 Alpine Floodplain (CES204.161) (NatureServe 2015)

Biophysical Settings: Alaskan Pacific Maritime Alpine Floodplain (BpS 7716760) (LANDFIRE 2009)

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

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

### **Ecological site concept**

Subalpine Scrub Gravelly Drainageway ecological sites occur on low order streams in high-elevations (LANDFIRE 2009; NatureServe 2018). The soils are formed in alluvium and are a mixture of silt, sand, gravel, and cobbles (Boggs et al. 2008).

The reference vegetation on this ecological site is defined by tall shrubs. Sitka alder (*Alnus viridis* (Chaix) DC. ssp. *sinuata* (Regel) Å. Löve & D. Löve) and felleaf willow (*Salix alaxensis* (Andersson) Coville) are the dominant species. Flooding is the primary disturbance factor of Subalpine Scrub Gravelly Drainageways (LANDFIRE 2009; NatureServe 2018).

### Associated sites

R220XY358AK	<b>Subalpine Scrub Gravelly Dry Slopes</b> Occur adjacent to R222XY361AK on a higher landscape positions
R222XY360AK	<b>Alpine Herbaceous Wet Organic Depressions</b> Occur at the headwaters of and within riparian zones associated with R222XY361AK

### Similar sites

R220XY358AK	<b>Subalpine Scrub Gravelly Dry Slopes</b> The tall shrub component of the mosaic is similarly dominated by Sitka alder, but the site occurs on creep landforms
R220XY349AK	<b>Subalpine Scrub Gravelly Dry Chutes</b> The site is similarly dominated by Sitka alder, but dwarf shrubs and herbs are prominent ground covers

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Alnus viridis</i> ssp. <i>sinuata</i> (2) <i>Salix alaxensis</i>
Herbaceous	Not specified

### Physiographic features

Subalpine Scrub Gravelly Drainageway ecological sites occur on low order streams in high-elevations. They are reported at elevations up to 2000 feet ASL on the Glacier Bay National Park and Preserve (Boggs et al. 2008). The site experiences high energy flooding for portions of the year (NatureServe 2018).

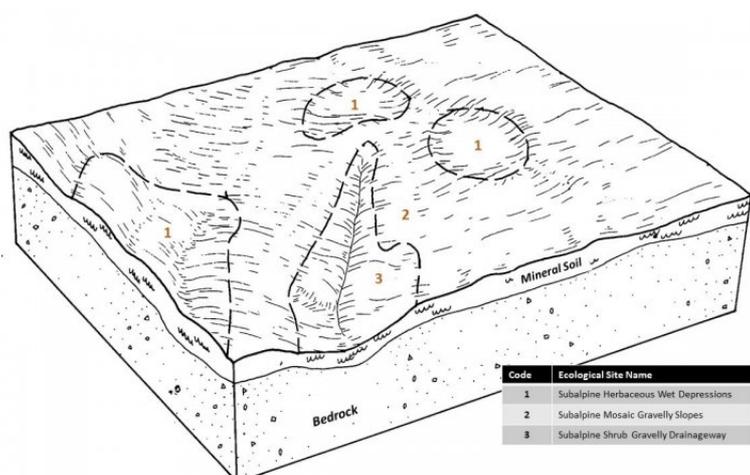


Figure 1. Representative block diagram of Subalpine Scrub Gravelly Drainageway

### 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 Scrub Gravelly Drainageway may be classified as a RIVERINE wetland under the Hydrogeomorphic (HGM) classification system (Smith et al. 1995; USDA-NRCS 2008) and as a Palustrine, Broad-leaved Deciduous Scrub-Shrub Wetland under the National Wetlands Inventory (FGDC 2013). Channel overbank flow and subsurface hydraulic connections are the main sources of water for this ecological site (Smith et al. 1995).

## Wetland description

Primary wetland hydrology indicators for Subalpine Herbaceous Wet Depressions may include but are not limited to: Surface water (A1), High water table (A2), Saturation (A3), Sediment deposits (B2), and Drift deposits (B3). Secondary wetland hydrology indicators may include: Drainage pattern (B10), Geomorphic position (D2), and FAC-neutral test (D5) to confirm wetland status (USACE 2007).

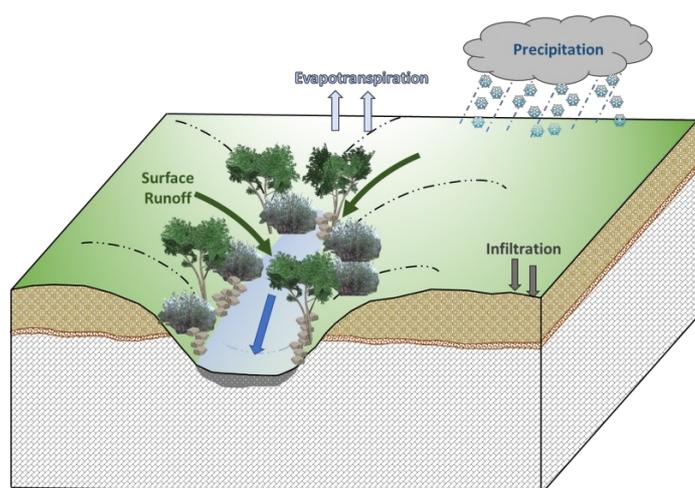


Figure 2. Hydrologic cycling in Subalpine Scrub Gravelly Drainageway ecological site.

## 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 occur on low-order streams. The parent material is alluvium, generally comprised of a mixture of silt, sand, gravel, and cobbles (NatureServe 2018).

## Ecological dynamics

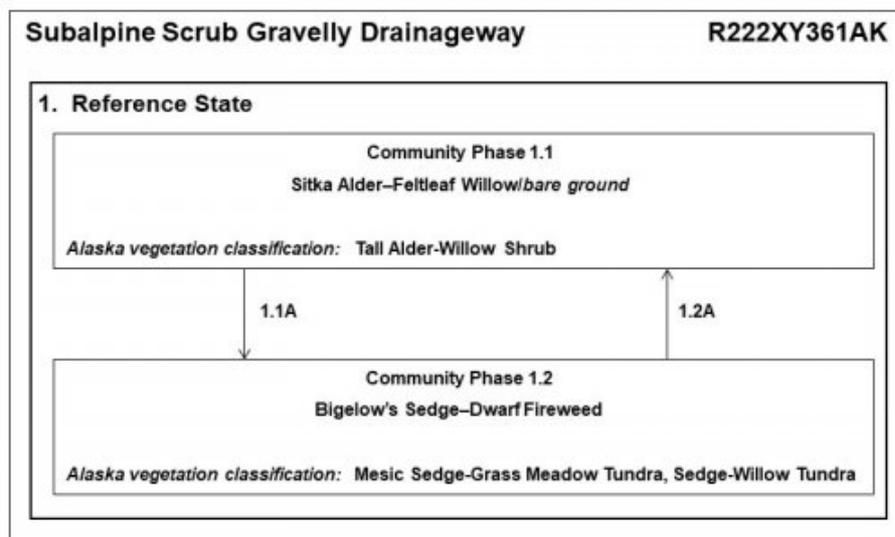
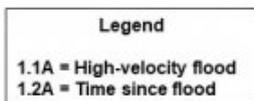
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on historical data, current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. 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 Scrub Gravelly Drainageway ecological sites form an aspect of this vegetative continuum. This ecological site occurs on low order streams at high elevation. Species characteristic of this ecological site consist of tall shrubs tolerant of frequent flooding disturbances.

Flooding is the primary disturbance factor of Subalpine Scrub Gravelly Drainageway ecological sites. Frequent flooding regularly transports and deposits alluvial materials across the site as well as periodically shifts the position of the stream channel. These fluvial processes and associated soil moisture regimes determine plant community composition (NatureServe 2018).

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 shrubland community, dominated by tall shrubs and open ground. The two community phases within the reference state are maintained by frequent flooding.

## Community 1.1

### Sitka alder-Feltleaf willow/bare ground



The community phase is characterized by a near continuous (at least 75 percent) cover of tall shrubs. The dominant species are Sitka alder and feltleaf willow, but other willows may be present including diamondleaf willow (*Salix planifolia* Pursh) netleaf willow (*Salix reticulata* L.) (Viereck et al. 1992; NatureServe 2018). The ground cover is comprised of gravelly and cobbly alluvium interspersed with sparse herbs.

## Community 1.2

### Bigelow's sedge-Dwarf fireweed

This community phase will occur following a high-intensity scouring event that de-vegetates the area. Exposed soil and bare rocks are the predominant ground cover. Few herbs form the early successional plant community including Bigelow's sedge (*Carex bigelowii* Torr. ex Schwein.) and dwarf fireweed (*Chamerion latifolium* (L.) Holub) (Viereck et al. 1992; NatureServe 2018). New shoots of Sitka alder and feltleaf willow may begin to emerge as well.

## Pathway 1.1A

### Community 1.1 to 1.2

High-velocity flood

## Pathway 1.2A

### Community 1.2 to 1.1

Time since flood

## 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:**

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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):**
- 

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):**
- 

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:**
-