

## **Ecological site R222XY360AK**

### **Alpine Herbaceous Wet Organic Depressions**

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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): 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 Wet Meadow (CES204.160) (NatureServe 2015)

Biophysical Settings: Alaskan Pacific Maritime Alpine Wet Meadow (BpS 7816730) (LANDFIRE 2009)

Alaska Natural Heritage Program Landcover Class: Herbaceous (Wet-Marsh) (Boggs et al. 2016)

Alaskan Vegetation Classification: Wet Sedge-Herb Meadow (Viereck et al. 1992)

#### **Ecological site concept**

Subalpine Herbaceous Wet Depressions ecological sites occur on depressions on high-elevation sites (Viereck et

al. 1992; DeVelice et al. 1999; Boggs et al. 2008; NatureServe 2018). The soils are fine textured and poorly drained. Shallow, standing water may be present (Viereck et al. 1992; LANDFIRE 2009).

The reference vegetation on this ecological site is defined by herbaceous plants tolerant of cold, saturated conditions. Longawn sedge (*Carex macrochaeta* C.A. Mey) and Canadian burnet (*Sanguisorba canadensis* L.) are the dominant and characteristic species, respectively, with deercabbage (*Nephrophyllidium crista-galli* (Menzies ex Hook.) Gilg) increasing in importance in the southern half of the MLRA. Cold temperatures and stable hydrologic conditions maintain this plant community (Viereck et al. 1992; LANDFIRE 2009).

## Associated sites

R220XY358AK	<b>Subalpine Scrub Gravelly Dry Slopes</b> Located higher on the landscape
R220XY361AK	<b>Subalpine Shrub Dry Flood Plain</b> Located lower on the landscape

## Similar sites

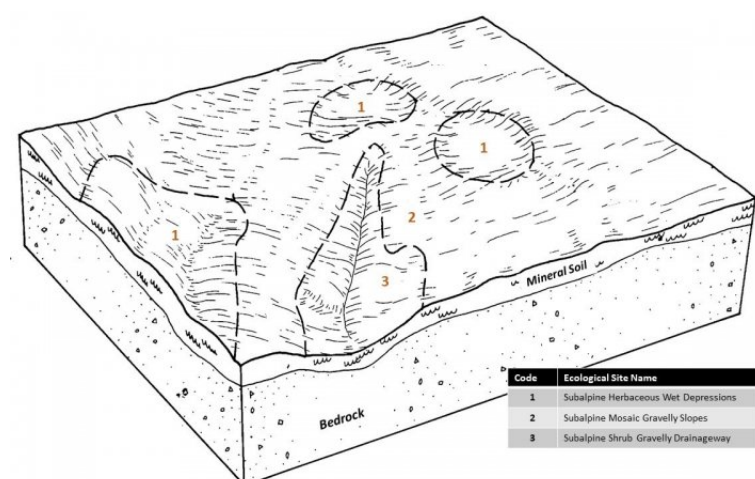
R220XY358AK	<b>Subalpine Scrub Gravelly Dry Slopes</b> The herbaceous component of this mosaic plant community may resemble R222XY360AK, but the species composition is different and the site is not a wetland
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Carex macrochaeta</i> (2) <i>Sanguisorba canadensis</i>

## Physiographic features

Subalpine Herbaceous Wet Depressions ecological sites occur on depression in high-elevation sites. They are reported from 2000 to 3000 feet ASL (DeVelice et al. 1999; Boggs et al. 2008). The site may experience seasonal flooding and shallow standing water (Viereck et al. 1992; LANDFIRE 2009).



**Figure 1. Representative block diagram of Subalpine Herbaceous Wet Depressions 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).

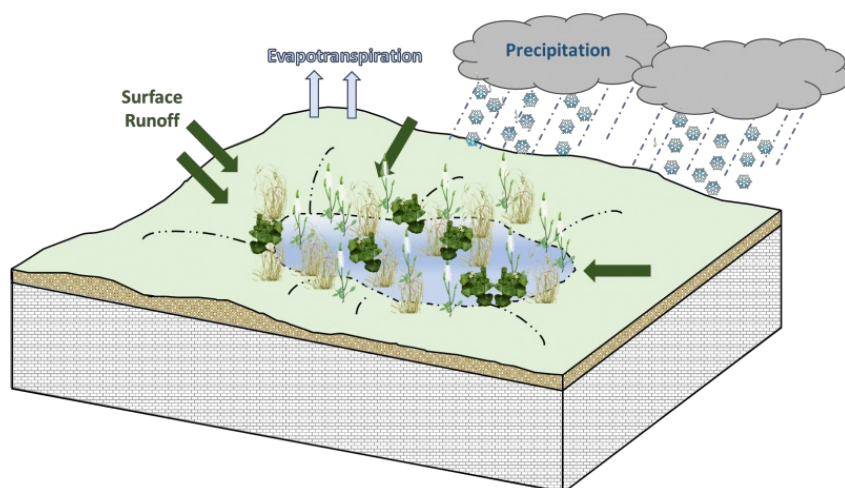
Temperature and precipitation are affected by latitude, elevation, and proximity to maritime or continental zones. The average annual temperature and length of freeze-free period are not known. At the higher elevations, freezing temperatures are likely to occur during any month of the year. Most of the 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 Herbaceous Wet Depressions may be classified as a MINERAL FLATS or a SLOPE wetland under the Hydrogeomorphic (HGM) classification system (Smith et al. 1995; USDA-NRCS 2008) and as a Palustrine, Persistent Emergent, Continuously Saturated Wetland under the National Wetlands Inventory (FGDC 2013). Precipitation, interflow from surrounding uplands, and ground water return flow 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), and Sparsely vegetated concave surface (B8). Secondary wetland hydrology indicators may include: Geomorphic position (D2), Shallow aquitard (D3), and positive FAC-neutral test (D5) results of plant species that confirm wetland status (USACE 2007).



**Figure 2. Hydrologic cycling in Subalpine herbaceous Wet Depressions 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 in depressions in high-elevation valleys, low-energy riparian zones, and shallow sideslopes. They are fine-textured mineral soils, although some may have a shallow peat layer. They are saturated

for a portion of the growing season, and shallow standing water may be present (Viereck et al. 1992; DeVelice et al. 1999; Boggs et al. 2008; LANDFIRE 2009).

**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 Herbaceous Wet Depressions ecological sites form an aspect of this vegetative continuum. This ecological site occurs on depressions in the subalpine parkland life zone near treeline. Herbaceous plants tolerant of wet conditions are characteristic species of this ecological site.

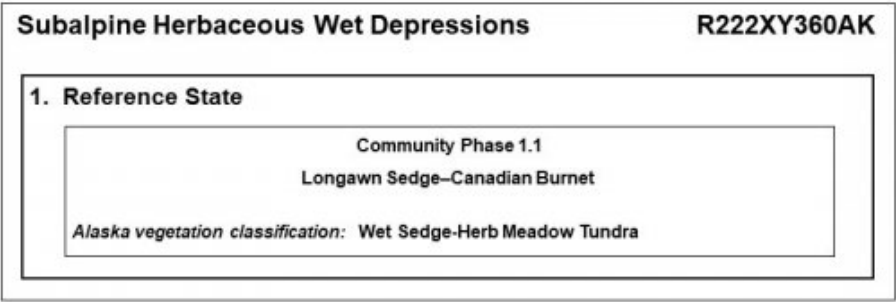
Subalpine Herbaceous Wet Depressions ecological sites are relatively stable. The continuously saturated conditions during the growing season maintain the plant community and ecological functions (LANDFIRE 2009).

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**

Legend

No known state transitions or phase shifts



**State 1**  
**STATE 1 - REFERENCE STATE**

The reference plant community is categorized as a wet herbaceous community, dominated by graminoids and forbs that are tolerant of saturated environments. The one community phase within the reference state is maintained by stable hydrologic conditions.

## Community 1.1

### Longawn sedge- Canadian burnet



Figure 3. Subalpine Herbaceous Wet Depressions ecological site at Glacier Bay National Park and Preserve (Boggs et al. 2008).

The community is characterized by an open plant cover of sedges and forbs. The dominant species include longawn sedge and Canadian burnet, with deercabbage becoming more prominent in the south (Viereck et al. 1992; DeVelice et al. 1999; Boggs et al. 2016). Other herbaceous species can include seep monkeyflower (*Mimulus guttatus* DC.), purple monkeyflower (*Mimulus lewisii* Pursh), arctic sweet coltsfoot (*Petasites frigidus* (L.) Fr. Var. *frigidus*), fireleaf leptarrhena (*Leptarrhena pyrolifolia* (D. Don) R. Br. ex Ser.), Nootka lupine (*Lupinus nootkatensis* Donn ex Sims), purple marshlocks (*Comarum palustre* L.), and buckbean (*Menyanthes trifoliata* L.) (Viereck et al. 1992; Boggs et al. 2008; Boggs et al. 2016; NatureServe 2018). Few dwarf shrubs may be present and include netleaf willow (*Salix reticulata* L.) and sprouting leaf willow (*Salix stolonifera* Coville) (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:**

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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):**
- 
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):**
- 
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:**
-