

# **Ecological site R240XY731AK**

## **Subalpine Ericaceous Scrub Loamy Slopes**

Last updated: 6/05/2025

Accessed: 03/26/2026

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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): 240X–Nulato Hills-Southern Seward Peninsula Highlands

The Nulato Hills-Southern Seward Peninsula Highlands (MLRA 240X) is in Western Alaska, which describes the mostly treeless zone of discontinuous permafrost in the arctic. This MLRA is approximately 18,500 square miles in size. The terrain is defined by rolling hills, low mountains and river valleys. Flood plains systems are common but generally narrow. This watershed drains into Norton Sound and Bering Sea. Major rivers include the Unalakleet, Koyuk, and Fish Rivers. The area is mostly undeveloped wild land that is sparsely populated. Residents use this remote area primarily for subsistence hunting, fishing, and gathering. Villages are primarily located along the coast and include the two larger municipalities of Nome and Unalakleet, and various other villages such as Koyuk and Saint Michael.

### **Geology and Soils**

This MLRA was mostly unglaciated during the late Pleistocene. Glaciers were limited to upper elevations on the Seward Peninsula. Coastal lowlands are filled with Holocene deposits. Silty eolian deposits mantle coastal areas and the slopes of lower elevation hills and mountains. Flood plains and terraces are built on fluvial deposits. Modified glacial moraines are evident in areas of past glacial activity. Bedrock material is primarily a mix of sedimentary and volcanic rock (USDA, 2022).

This MLRA is in the zone of discontinuous permafrost. Shallow permafrost is most common on coastal plains, gentle footslopes, and organic swales. Permafrost constitutes a root-restrictive layer that perches water and creates poorly drained or poorly drained

soils.

Common soil orders include Gelisols that support permafrost and Entisols and Inceptisols which are marked by little to no development. The Gelisols are typically shallow or moderately deep to permafrost, occur on finer to gravelly textured sediments, and are poorly or very poorly drained. Common Gelisol suborders are Histels, Orthels, and Turbels. The Histels have thick accumulations of surface organic material and commonly occur on mounds of plains. The Orthels and Turbels have comparably thinner surface organic material. Turbels show signs of cryoturbation while Orthels do not. Entisols and Inceptisols are common on shallow rocky soils of the alpine and subalpine, as well as scoured flood plain soils. Non-soil areas (rock outcrop, rubble land and beaches) make up approximately five percent of the MLRA surface.

## Climate

The climate is a mix of maritime in the summer and continental in the winter, which is a result of sea ice in Norton Sound. Summers are brief and cool summers and winters are long and cold. Mean annual precipitation is 15 to 20 inches at lower elevations, increasing to 20 to 40 inches at higher elevations (USDA, 2022). Mean annual temperatures ranges from 23 to 31 degrees F (SNAP, 2014a).

## Vegetation

Vegetation is mainly influenced by site and soil characteristics such as temperature-degree days, exposure to wind, soil depth, and soil hydrology. Dwarf scrublands are present across much of the uplands. Lower elevations generally support more developed soils. Well drained soils support tall shrubs. Organic soils support mosses, graminoids and low shrubs. Forests occur on some low mountain slopes and river valleys but are associated with the Yukon-Kuskokwim Highlands (MLRA 230X). Tussock tundra is ubiquitous across much of the poorly drained, low gradient slopes and coastal plains (USDA, 2022).

## LRU notes

There are two life zones delineated by plant communities along a temperature gradient driven by elevation. The predominant climate across MLRA 240X is arctic lowlands. Low mean annual air temperatures and a short growing season shape the vegetation across the landscape. The alpine climate zone is generally reserved for elevations above 1,200 feet. Decreased mean annual temperatures at these higher elevations support unique soils and vegetation.

## Classification relationships

Alaska Vegetation Classification:

Open low scrub (II.C.2 - level III) / Mesic shrub birch – ericaceous (II.C.2.c - level IV)

(Viereck et al., 1992)

**BioPhysical Settings:**

6816390 – Arctic Mesic – Wet Willow Shrubland

6816822 – Alaska Arctic Scrub Birch-Ericaceous Shrubland – Frequent Fire  
(Landfire, 2009)

**Circumpolar Arctic Vegetation Map:**

S2.1 – Low -shrub communities (comms 44 & 45)

(CAVM Team, 2003)

**Ecological site concept**

- Occurs on nearly level to strongly sloping hill and mountain slopes
- Typically occurs between 1,000 and 1,200 feet above sea level but may extend to much higher and lower slopes as local annual temperature allows
- Soils are cold and wet and may support permafrost
- The reference plant community is a birch-ericaceous shrubland with graminoids throughout
- Fire is the major disturbance and is responsible for one post-disturbance community

**Associated sites**

R240XY710AK	<b>Arctic Scrub Wet Drainages</b> R240XY710AK describes scrub wet drainages. These mountain drainages bisect R240XY731AK where they are together on slopes.
R240XY730AK	<b>Alpine Dwarf Scrub Gravelly Slopes</b> R240XY730AK describes the alpine dwarf scrub-lichen community. It is located on shallower, less developed soils on exposed landforms. It is normally upslope of this subalpine ecological site.
R240XY732AK	<b>Subalpine Tall Scrub Gravelly Slopes</b> R240XY732AK describes alder slopes. Both ecological sites are on the same mountain slopes. Associated soils are more gravelly and better drained than those associated with this ecological site.

**Similar sites**

R240XY710AK	<b>Arctic Scrub Wet Drainages</b> R240XY710AK describes scrub wet drainages. R240XY731AK covers a wide range of soil types, and the vegetation may be similar on wetter soils. These ecological sites are differentiated as the drainages flood and subalpine slopes do not.
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Vaccinium uliginosum</i> (2) <i>Ledum palustre ssp. decumbens</i>
Herbaceous	(1) <i>Calamagrostis canadensis</i> (2) <i>Carex</i>

## Physiographic features

This ecological site occurs on non-alpine arctic mountain and hill slopes. Elevation generally ranges from 1,000 to 1,200 feet above sea level but can extend much lower and higher in elevation as temperature conditions allow. This ecological site is restricted to the subalpine in areas where trees have colonized from neighboring MLRAs. Slope gradients are nearly level to strongly sloped (0 to 12 percent). This ecological site occurs on all aspects. A shallow water table is present throughout the growing season.

**Table 2. Representative physiographic features**

Slope shape across	(1) Linear (2) Concave
Slope shape up-down	(1) Linear (2) Concave
Hillslope profile	(1) Backslope (2) Footslope (3) Shoulder
Landforms	(1) Mountains > Mountain (2) Hills > Hill (3) Mountains > Mountain > Mound
Runoff class	Negligible to medium
Flooding frequency	None
Ponding frequency	None
Elevation	305–366 m
Slope	0–12%
Water table depth	0–15 cm
Aspect	W, NW, N, NE, E, SE, S, SW

**Table 3. Representative physiographic features (actual ranges)**

Runoff class	Not specified
Flooding frequency	Not specified

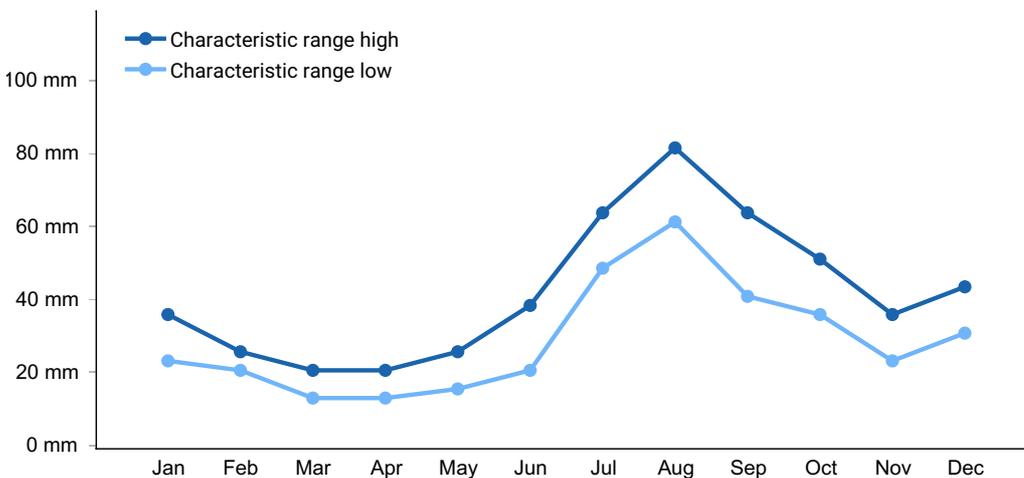
Ponding frequency	Not specified
Elevation	61–1,219 m
Slope	Not specified
Water table depth	0–99 cm

## Climatic features

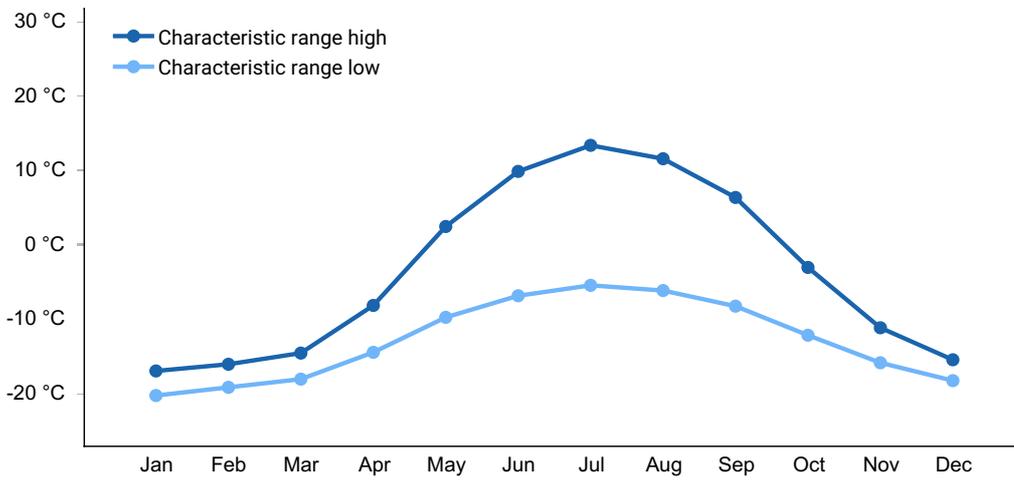
The mixed maritime/continental climate in MLRA 240X includes short, cool summers and long, cold winters. Mean annual temperature ranges from 23 to 31 degrees Fahrenheit, with temperatures typically below freezing from November through March. Approximately 40 percent of total precipitation occurs during the June – August growing season (PRISM, 2018; SNAP, 2014a; SNAP, 2014b). Across the MLRA, snowfall ranges from 40 to 100 inches (USDA-NRCS, 2022).

**Table 4. Representative climatic features**

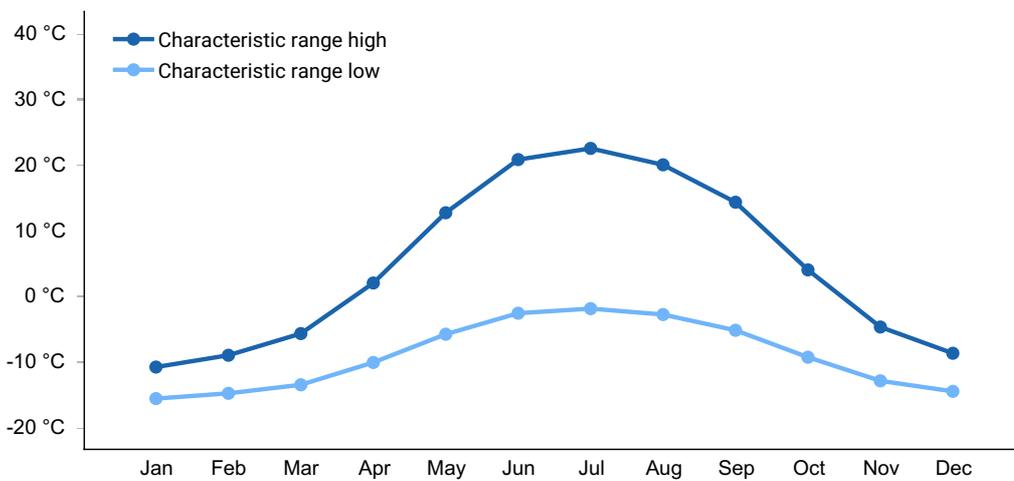
Frost-free period (characteristic range)	64-84 days
Freeze-free period (characteristic range)	80-104 days
Precipitation total (characteristic range)	330-508 mm
Frost-free period (actual range)	24-96 days
Freeze-free period (actual range)	72-108 days
Precipitation total (actual range)	254-584 mm
Frost-free period (average)	72 days
Freeze-free period (average)	92 days
Precipitation total (average)	356 mm



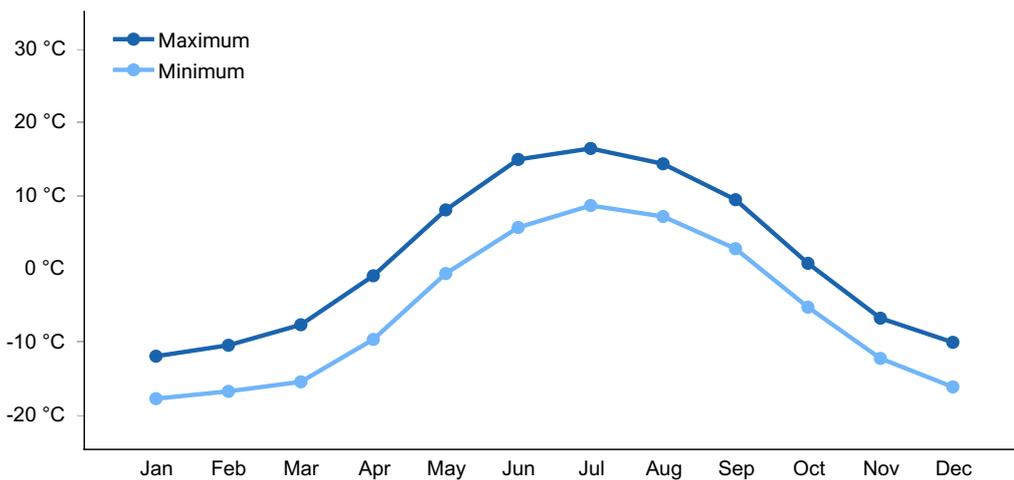
**Figure 1. Monthly precipitation range**



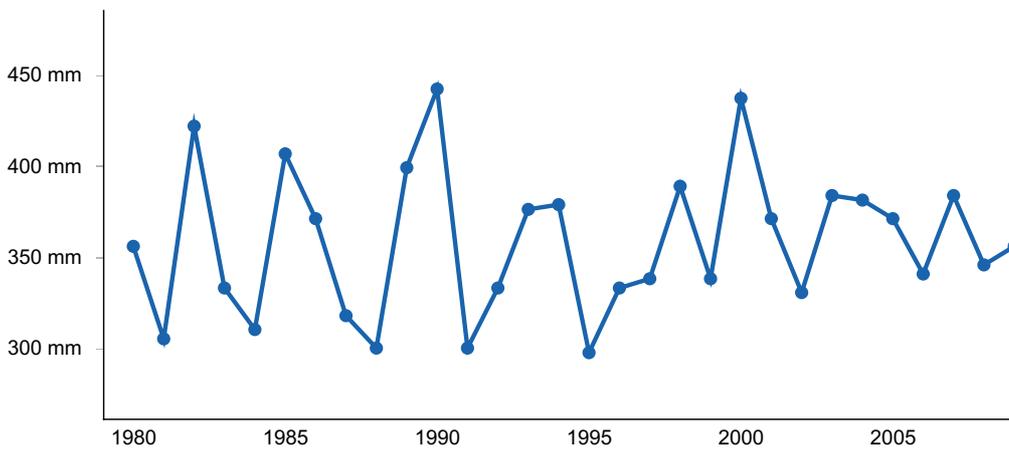
**Figure 2. Monthly minimum temperature range**



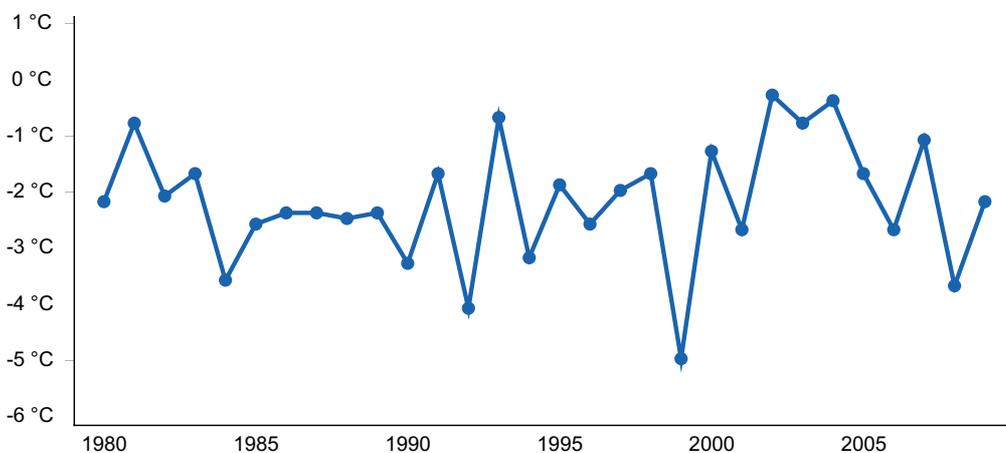
**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

## Influencing water features

Precipitation and throughflow are the main source of water for this ecological site. Surface runoff and throughflow contribute water to downslope ecological sites.

## Wetland description

This ecological site is a slope wetland under the Hydrogeomorphic (HGM) classification system (Brinson, 1993; USDA-NRCS 2008). There may be some surface water in concave slopes, but in general, this wetland type does not support depressional storage.

Depth to the water table may decrease during peak snow melt and following summer storms.

## Soil features

Soils are moist and cold Inceptisols or Gelisols (Soil Survey Staff, 2013). They formed in organic material over loess and/or colluvium. Rock fragments are absent from the soil

surface. Soils have a thick organic cap of 9 to 12 inches. Soils are very deep with potential for a root restrictive layer of permafrost or bedrock. Subsurface rock fragment volume ranges up to twenty percent. Soil pH is extremely to moderately acidic. Soils are poorly drained and wet during the growing season.

**Table 5. Representative soil features**

Parent material	(1) Loess (2) Colluvium
Surface texture	(1) Peat (2) Mucky peat (3) Silt loam
Drainage class	Poorly drained
Permeability class	Moderate
Depth to restrictive layer	51–152 cm
Soil depth	152 cm
Surface fragment cover ≤3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	18.54–29.72 cm
Soil reaction (1:1 water) (0-25.4cm)	3.3–6
Subsurface fragment volume ≤3" (0-152.4cm)	0–20%
Subsurface fragment volume >3" (0-76.2cm)	0%

**Table 6. Representative soil features (actual values)**

Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Not specified
Depth to restrictive layer	Not specified
Soil depth	Not specified
Surface fragment cover ≤3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-25.4cm)	Not specified

Subsurface fragment volume $\leq 3"$ (0-152.4cm)	0–22%
Subsurface fragment volume $> 3"$ (0-76.2cm)	Not specified

## Ecological dynamics

The Nulato Hills-Southern Seward Peninsula Highlands MLRA (MLRA 240X) occurs in Western Alaska with arctic vegetation and has a harsh climate that limits the composition and structure of plant communities. This area has cool, short summers and long, cold winters. Trees are restricted to warmer slopes in mountain valleys and flood plains. The expansive tundra is comprised of a mosaic of shrubs, sedges, moss, and lichen.

The low scrub reference plant community is shaped by site factors including cold temperatures and soil wetness caused by perched water atop a restrictive layer. Snowpack may shorten an already short growing season in concave positions. Cool temperatures and a shortened growing season support slower growing willows and evergreen ericaceous shrubs. Average shrub height is taller here than on nearby exposed, convex slopes.

Fire is the major disturbance on this ecological site. It is responsible for one unique post-disturbance community. Post-fire community composition depends on factors such as fire frequency and severity. Low-severity fires may only burn surface vegetation, leaving extant species to resprout immediately from seed source and surviving root stock. A severe fire burns the organic layer and destroys part or all of the root stock. In this instance, the post-fire community is comprised of colonizing, fast-growing herbaceous species.

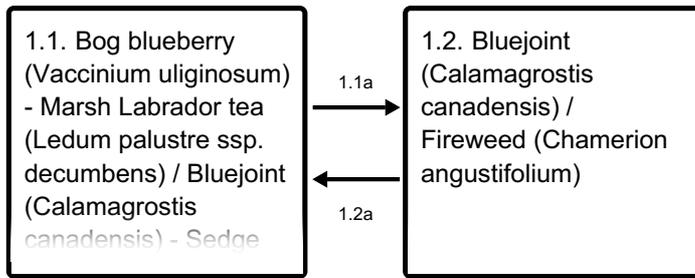
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant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

## State and transition model

### Ecosystem states

1. Reference State
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## State 1 submodel, plant communities



1.1a - Fire

1.2a - Fire recovery

## State 1 Reference State

The reference state describes two distinct vegetative communities grouped by the structure and dominance of the vegetation (e.g., shrubs, forbs, and graminoids) and their ecological function and stability. Fire is the major disturbance on this ecological site. Soil and site factors including drainage class and, mean annual air temperature influence the vegetation in the reference state. The reference state is developed and characterized using available vegetation models, including Landfire BpS and the Alaska vegetation classification system (Landfire, 2009; Viereck et al., 1992).

### Dominant plant species

- tealeaf willow (*Salix pulchra*), shrub
- resin birch (*Betula glandulosa*), shrub
- dwarf birch (*Betula nana*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- Bigelow's sedge (*Carex bigelowii*), grass

### Community 1.1

**Bog blueberry (*Vaccinium uliginosum*) - Marsh Labrador tea (*Ledum palustre ssp. decumbens*) / Bluejoint (*Calamagrostis canadensis*) - Sedge (*Carex* spp.)**



**Figure 7. The reference plant community supports a mixed ericaceous shrubland with lichens in the subalpine.**



**Figure 8. The wetter range of soils in this ecological site can support more willows.**



**Figure 9. The drier range of soils in this ecological site support resin birch in the top canopy.**

This community is a closed low shrub scrubland (Viereck et al., 1992). The major plant groups are low shrubs, medium shrubs, tall graminoids, and tall forbs. Community vegetation occurs on a moisture gradient. Wetter soils and areas support more willow, while drier areas support more birch and ericaceous shrubs. Alder may be present, particularly along ecotonal gradients. The shaded understory is comprised of graminoids, ferns, and forbs. Ground cover is predominantly herbaceous litter but also contains mosses and lichens.

### **Dominant plant species**

- tealeaf willow (*Salix pulchra*), shrub
- resin birch (*Betula glandulosa*), shrub
- dwarf birch (*Betula nana*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- sedge (*Carex*), grass
- Altai fescue (*Festuca altaica*), grass
- reindeer lichen (*Cladina*), other herbaceous
- cup lichen (*Cladonia*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous

### **Community 1.2**

**Bluejoint (*Calamagrostis canadensis*) / Fireweed (*Chamerion angustifolium*)**

This community is a mesic graminoid herbaceous meadow (Viereck et al., 1992). The major plant groups are tall graminoids, medium graminoids and medium forbs. Community composition depends on fire disturbance characteristics. A more intense fire will alter a community to a higher degree than a less intense fire. Fast-growing herbaceous species with wind-dispersed seeds are the most common species after a severe fire. Extant species from the pre-fire community may be present, particularly after a low-severity fire. Ground cover is mostly herbaceous litter.

### **Dominant plant species**

- bluejoint (*Calamagrostis canadensis*), grass
- sedge (*Carex*), grass
- fireweed (*Chamerion angustifolium*), other herbaceous

### **Pathway 1.1a**

#### **Community 1.1 to 1.2**

Fire is the major disturbance on this site. Drier areas may ignite directly from lightning strikes, while wetter areas are more likely to catch fire from neighboring vegetation. The fire return interval is hypothesized to be very long (Landfire, 2009b). A severe fire burns the organic layer and can destroy rootstocks and the seed bank. Post-fire vegetation is comprised primarily of disturbance-loving, fast-growing, seed-dispersing herbaceous species. Absent fire, the vegetative composition of this community is stable and unlikely to change over time (Viereck et al., 1992; Landfire, 2009b).

### **Pathway 1.2a**

#### **Community 1.2 to 1.1**

Fire recovery occurs regularly quickly following low intensity fires. Recovery after high-intensity fires takes longer. Several shrubs, such as tealeaf willow, are fire-adapted and will quickly grow back if the below ground rootstock is not destroyed (Uchytel, 1991). Other shrub species may take longer to colonize and support a reproducing population.

### **Additional community tables**

#### **Inventory data references**

Vegetative communities and transitions are described using existing models and expert knowledge. There are no vegetation inventory data points in NASIS associated with this ecological site.

External model data sources:

The Alaska-Yukon Region of the Circumboreal Vegetation Map (CBVM) (Jorgensen and Meidinger, 2015)

Circumpolar Arctic Vegetation Mapping Project (CAVM, 2003).

LANDFIRE Biophysical Settings Models (Landfire, 2009)

The Alaska Vegetation Classification (Vioreck et al., 1992)

## **Other references**

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Uchytel, R.J. 1991. *Salix pulchra*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <https://www.fs.usda.gov/database/feis/plants/shrub/salpul/all.html> Accessed March 10, 2025.

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## **Acknowledgments**

Some or all of the soil – ecological site correlations described in this document were first constructed by the Homer SSO staff members working on initial surveys in the Nulato Hills (AK630 and AK728). Many thanks are given to the NRCS staff who have provided feedback regarding the MLRA 240X ecological site key and ESDs.

This ecological site description (ESD) fulfills the requirements of the Provisional Ecological Site (PES) national initiative. This ESD is published to fit current site-soil correlations as they are currently mapped and understood. Further data collection may provide the information to update this ESD from the provisional level to the approved level.

## 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	03/26/2026
Approved by	Blaine Spellman
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:**

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