USDA **Natural Resources**
Conservation Service

Ecological site R240XY707AK
Arctic Scrub-Sedge Coastal Plain

Last updated: 6/05/2025
Accessed: 03/24/2026

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:
Dry soil: Dwarf ericaceous scrubland (II.D.2 – level III) / Crowberry dwarf shrub tundra

(II.D.2.c – level IV)
Wet, frozen soil: Wet graminoid herbaceous (III.A.3 – level III) / Wet sedge-grass meadow tundra (III.A.3.b – level IV)
Wet, non-frozen soil: Wet graminoid herbaceous (III.A.3 – level III) / Halophytic grass wet meadow (III.A.3.h – level IV)
(Viereck et al., 1992)

BioPhysical Settings:
6817010 – Alaska Arctic Coastal Sedge-Dwarf Shrubland
6817120 – Alaska Arctic Coastal Brackish Meadow
6817040 – Alaska Arctic Permafrost Plateau Dwarf Shrub Lichen Tundra
(Landfire, 2009)

Circumpolar Arctic Vegetation Map:
S1.2 – Erect dwarf-shrub, lichen communities
(CAVM Team, 2003)

Ecological site concept

• The coastal plain complex ecological site describes all areas affected by coastal flooding at or slightly above sea level
• Occurs on plains and includes depressions
• Soils are varied and include well drained silt and silt-loam soils to wet, frozen and unfrozen, peat and mucky peat soils.
• Soil characteristics are partly driven by slope shape, flooding regime, and parent material
• Coastal flooding is the major disturbance
• The reference plant community is a scrub – sedge scrubland

Associated sites

R230XY601AK	**Boreal Forest Flood Plain Complex** F230XY601AK describes boreal flood plains. These flood plains carve through the coastal plain where rivers, such as the Unalakleet River, reach the sea.
R240XY720AK	**Arctic Tussock Tundra Frozen Plains** R240XY720AK is the tussock tundra. It is located on the sloping, non-flooding plains and foothills adjacent to and at higher elevations than the coastal plain.

Similar sites

R240XY720AK	**Arctic Tussock Tundra Frozen Plains** R240XY720AK describes tussock tundra areas. The tussock tundra supports ericaceous shrubs, which may appear similar to this ecological site. The tussock tundra does not experience coastal flooding.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Empetrum nigrum* (2) *Salix*
Herbaceous	(1) *Carex*

Physiographic features

This site occurs on coastal plains. Elevation ranges from sea level to approximately 70 feet. Slope gradients are nearly level (0 to 2 percent) and occurs on all aspects. A water table varies across the landform but is present in poorly drained soils and absent from well drained soils. Coastal flooding is common. Daily tidal flooding occurs daily at lower elevations, while higher elevations are usually only flooded during coastal storms.

Table 2. Representative physiographic features

Slope shape across	(1) Concave (2) Linear
Slope shape up-down	(1) Linear
Geomorphic position, flats	(1) Talf (2) Rise (3) Dip
Landforms	(1) Coastal plain > Coastal plain (2) Coastal plain > Depression (3) Coastal plain > Flood plain
Runoff class	Negligible to very low
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	0–21 m
Slope	0–2%
Ponding depth	30 cm
Water table depth	0–5 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)

|	
Flooding frequency	Rare to frequent
Ponding duration	Not specified
Ponding frequency	Not specified
Elevation	0–61 m
Slope	Not specified
Ponding depth	Not specified
Water table depth	0–25 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)	80-105 days
Freeze-free period (characteristic range)	100-130 days
Precipitation total (characteristic range)	330-508 mm
Frost-free period (actual range)	30-120 days
Freeze-free period (actual range)	90-135 days
Precipitation total (actual range)	254-584 mm
Frost-free period (average)	90 days
Freeze-free period (average)	115 days
Precipitation total (average)	356 mm
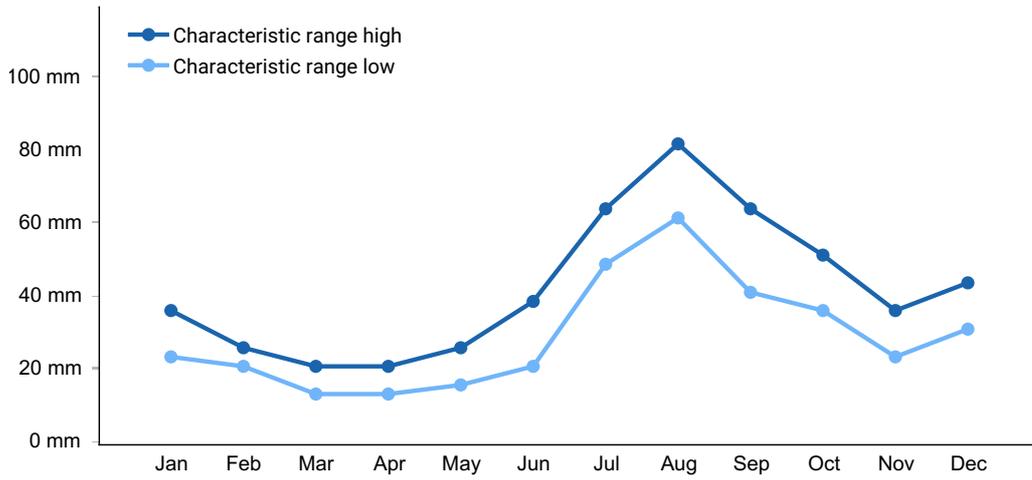
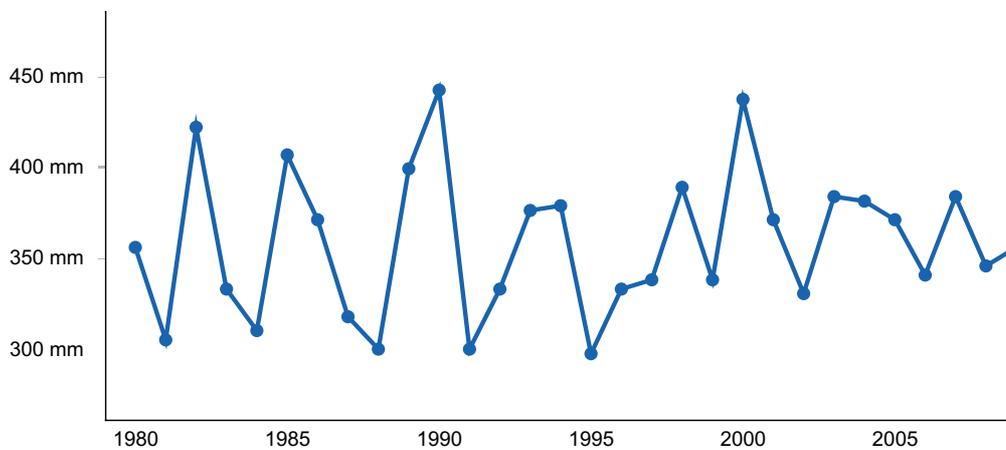**Figure 1. Monthly precipitation range**
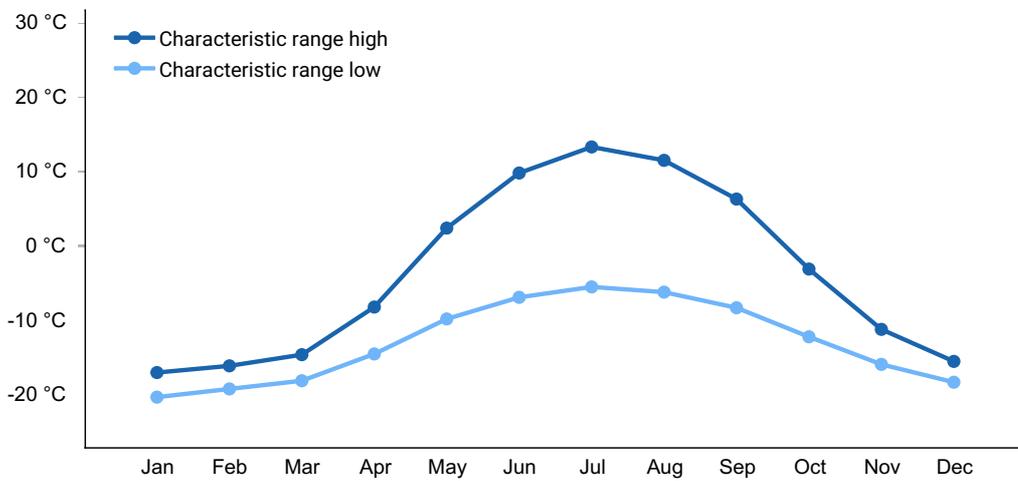
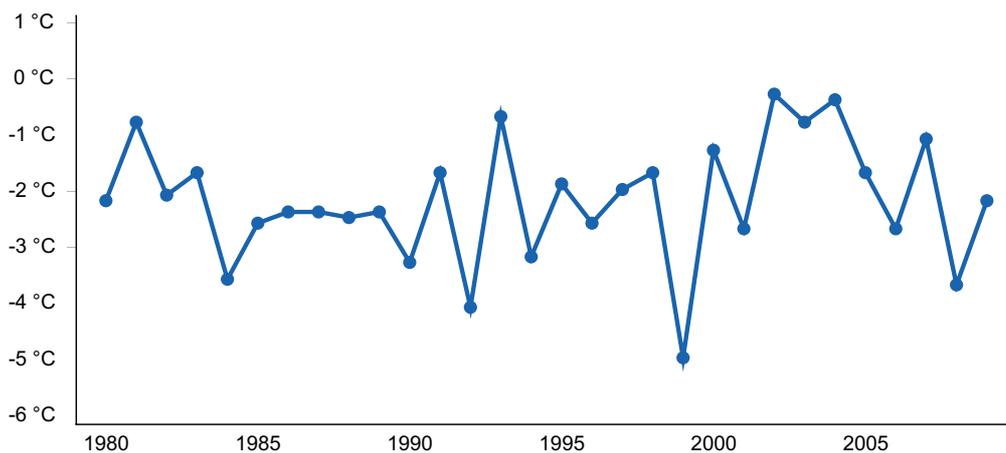**Figure 2. Monthly minimum temperature range**
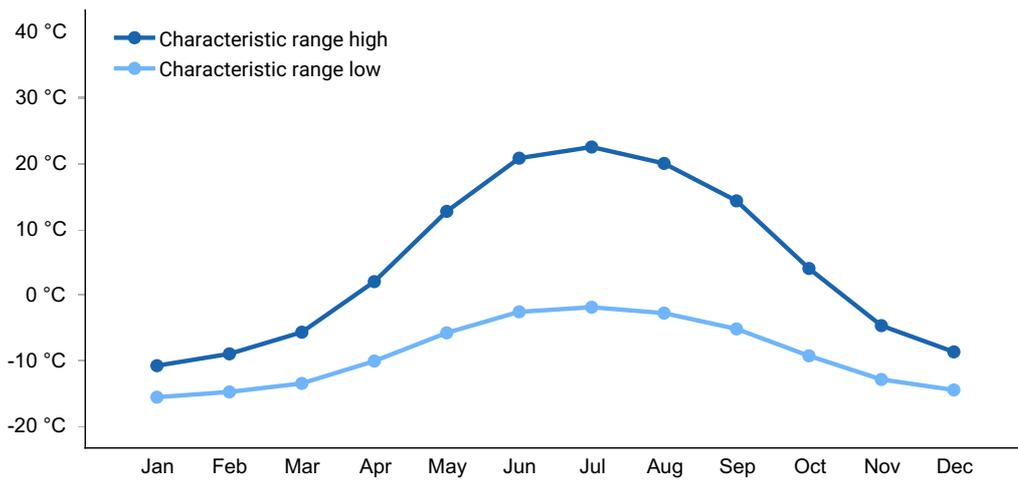
Figure 3. Monthly maximum temperature range
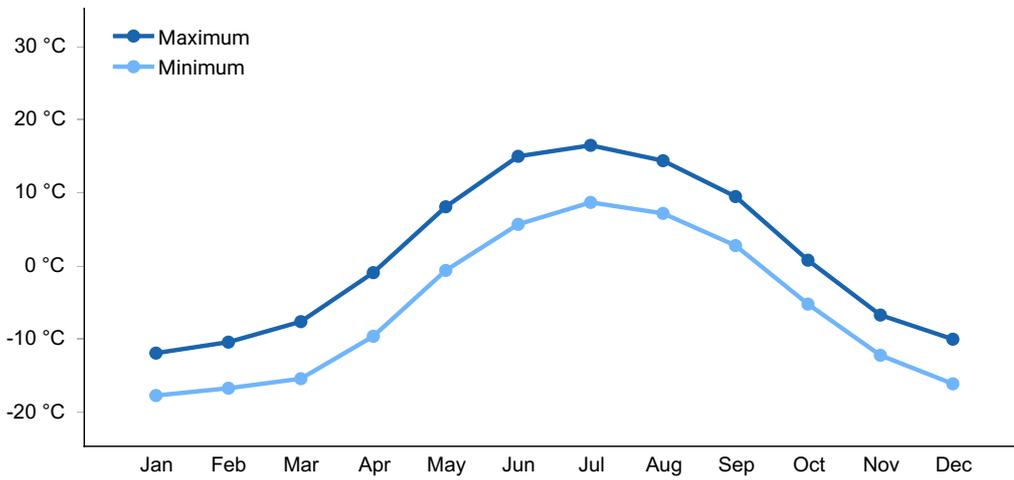
Figure 4. Monthly average minimum and maximum temperature

Figure 5. Annual precipitation pattern

Figure 6. Annual average temperature pattern

Influencing water features

This ecological site is influenced by riparian water features. Coastal flooding in the major disturbance. Rivers and streams that cross the coastal plain can also cause flooding. This flooding is most common during peak snow melt events.

Wetland description

Areas of this ecological site are estuarine fringe wetlands under the Hydrogeomorphic (HGM) classification system (Brinson, 1993; USDA-NRCS 2008). This ecological site is under the influence of the sea level as it fluctuates with the tides, as well as inundation during coastal storms. Most areas are not significantly dry for long periods.

Soil features

Various soils including Gelisols, Mollisols, Entisols, and Inceptisols. Parent material is comprised of marine deposits and may be mantled with alluvium and/or organic material. There are no rock fragments on the soil surface. Soils range from having no organic cap to thick Mollisols with three feet of organics at the surface. All soils are very deep, but some have permafrost, which is a root restrictive layer and supports a perched water table. There are no subsurface rock fragments. Soils are well drained to very poorly drained. Soil pH is very strongly to slightly acidic.

Table 5. Representative soil features

Parent material	(1) Alluvium (2) Marine deposits
Surface texture	(1) Fine sandy loam (2) Peat (3) Mucky peat
Drainage class	Very poorly drained to well drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	Not specified
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	19.05–34.8 cm
Soil reaction (1:1 water) (0-25.4cm)	4.8–7.6
Subsurface fragment volume <=3" (0-152.4cm)	0%
Subsurface fragment volume >3" (0-152.4cm)	0%

Table 6. Representative soil features (actual values)

Drainage class	Very poorly drained to excessively drained
Permeability class	Not specified
Depth to restrictive layer	61 cm
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 <=3" (0-152.4cm)	Not specified
Subsurface fragment volume >3" (0-152.4cm)	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 coastal plain complex is a mosaic of landforms including dunes, marshes, estuaries, plains, depressions, and tidal flats. All landforms share a regular coastal flooding disturbance, though at different frequencies and intensities. Tidal flats, estuaries and dunes are most frequently inundated with salt water and spray. These landforms commonly support halophytic vegetation. Freshwater marshes support less halophytic facultative wet and obligate wetland species in herbaceous meadows. Long ponding depressions contain emergent vegetation. Less frequently flooded areas on higher plains support a greater ratio of shrubs to graminoids.
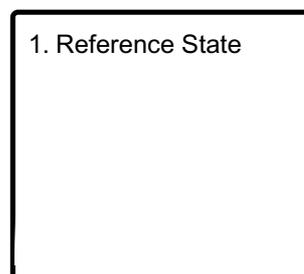
Coastal plain soils and vegetation are dynamic. Flooding and major erosional storms change the landscape. Two broad-scale communities are recognized on the coastal plain. Less frequently flooded areas support a scrub-sedge open scrubland. More frequently flooded and ponded areas support a wet herbaceous community. Future investigations into the dynamics of the coastal plain in MLRA 240X are likely to more clearly distinguish the soil and vegetative differences on different landforms comprising the coastal plain.

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
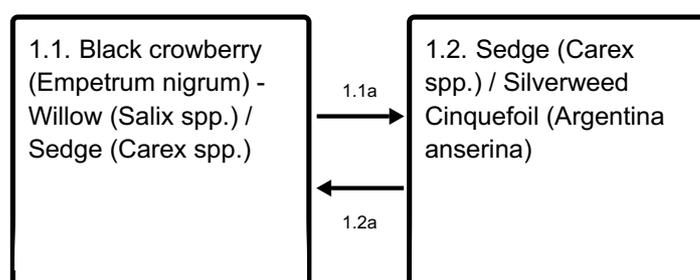
not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

State and transition model

Ecosystem states

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┌─────────────────────┐
│ 1. Reference State  │
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│                     │
│                     │
└─────────────────────┘
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State 1 submodel, plant communities

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┌─────────────────────┐          ┌─────────────────────┐
│ 1.1. Black crowberry│   1.1a   │ 1.2. Sedge (Carex   │
│ (Empetrum nigrum) - │ ───────► │ spp.) / Silverweed  │
│ Willow (Salix spp.) /│         │ Cinquefoil (Argentina│
│ Sedge (Carex spp.)  │ ◄─────── │ anserina)           │
│                     │   1.2a   │                     │
│                     │          │                     │
└─────────────────────┘          └─────────────────────┘
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1.1a - Increase flooding influences

1.2a - Decrease flooding influences

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 on the flood plain complex. The reference plant community is an open low scrubland comprised of ericaceous species with graminoids and forbs throughout. The presence of these and related communities are dictated temporally and spatially by hydric factors such as flooding frequency, post-flood ponding, water table depth and elevation. This 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) and field information collected in soil surveys AK630 and AK728.

Dominant plant species

- black crowberry (*Empetrum nigrum*), shrub
- dwarf birch (*Betula nana*), shrub
- willow (*Salix*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- bluejoint (*Calamagrostis canadensis*), grass

- bluegrass (*Poa*), grass
- beachhead iris (*Iris setosa*), other herbaceous

Community 1.1
Black crowberry (Empetrum nigrum) - Willow (Salix spp.) / Sedge (Carex spp.)

This community is an open low scrubland (Viereck et al., 1992). The major plant groups are low shrubs, medium graminoids, and medium forbs. This community supports a mix of ericaceous species and willows. Open areas support a mix of hydrophytic graminoid and forb species. Ground cover is predominantly herbaceous litter but also contains mosses.

Dominant plant species

- black crowberry (*Empetrum nigrum*), shrub
- willow (*Salix*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- sedge (*Carex*), grass
- beachhead iris (*Iris setosa*), other herbaceous
- seacoast angelica (*Angelica lucida*), other herbaceous

Community 1.2
Sedge (Carex spp.) / Silverweed Cinquefoil (Argentina anserina)

This community is a graminoid herbaceous meadow (Viereck et al., 1992). The major plant groups are tall and medium graminoids and medium forbs. Vegetation is primarily a mix of obligate to facultative wet wetland species. Low and dwarf willows may be present. In areas with frequent tidal flooding, this community may be a monotypic stand of Ramensk's sedge (*Carex ramenskii*). Ground cover is predominantly herbaceous litter but also contains mosses and woody litter in the form of driftwood.

Dominant plant species

- Lyngbye's sedge (*Carex lyngbyei*), grass
- looseflower alpine sedge (*Carex rariflora*), grass
- Ramensk's sedge (*Carex ramenskii*), grass
- silverweed cinquefoil (*Argentina anserina*), other herbaceous

Pathway 1.1a
Community 1.1 to 1.2

Black crowberry (Empetrum nigrum) - Willow (Salix spp.) / Sedge (Carex spp.)

Sedge (Carex spp.) / Silverweed Cinquefoil (Argentina anserina)

The driving influence separating vegetative communities in the reference state is different flood regimes. Both communities are susceptible to flooding, though community 1.2 floods more frequently and experiences higher salt stress from brackish and saltwater incursions. Hydrological shifts on the coastal plain due to changes in river flooding, erosion and dune shifts can cause areas supporting community 1.1 to undergo more intensive flooding, transforming it to community 1.2.

Pathway 1.2a
Community 1.2 to 1.1

Sedge (Carex spp.) / Silverweed Cinquefoil (Argentina anserina)

Black crowberry (Empetrum nigrum) - Willow (Salix spp.) / Sedge (Carex spp.)

The driving influence separating vegetative communities in the reference state is different flood regimes. Both communities are susceptible to flooding, though community 1.2 floods more frequently and experiences higher salt stress from brackish and saltwater incursions. Hydrological shifts on the coastal plain due to changes in river flooding, erosion and dune shifts can cause areas supporting community 1.2 to undergo less intensive flooding, transforming it to community 1.2.

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 (Viereck et al., 1992)

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Acknowledgments

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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	03/24/2026

Approved by	Blaine Spellman
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

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):**

_____

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:**