Ecological site R239XY057AK
Arctic Sedge Peat 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): 239X–Northern Bering Sea Islands

The Northern Bering Sea Islands (MLRA 239X) occurs in Western Alaska and includes Saint Lawrence (1,792 square miles), Nunivak (1,632 square miles), and Saint Matthew (137 square miles) Islands and several smaller adjacent islands all of which are surrounded by the Bering Sea. This MLRA makes up 3,705 square miles. The terrain primarily consists of nearly level to rolling plains and highlands with mostly gentle slopes. Coastal lowlands dotted with numerous small- and medium-size lakes make up a significant part of St. Lawrence Island. Steep, low-relief volcanic cones, vents, and lava flows are common throughout Nunivak Island and less common on St. Lawrence and St. Matthew Islands. Narrow, discontinuous sea cliffs, sand dunes, and sand sheets are along many stretches of the coast. Elevation ranges from sea level along the coast to 2,207 feet at the summit of Atuk Mountain, on St. Lawrence Island. The area is mostly undeveloped wild land that is sparsely populated. Residents use this remote area primarily for subsistence hunting, fishing, and gathering. Reindeer and/or muskox herding provides meat and other products to residents on Nunivak Island and St. Lawrence Islands. The largest communities on the islands are Diomede, Gambell, Mekoryuk, and Savoonga.

Geology and Soils

Across the islands, most of the landscape is mantled with late Tertiary and Quaternary alluvial, marine, and eolian surficial deposits. While a small portion of the northwest coast of St. Lawrence Island was glaciated (Patton et al. 2011), the vast majority of the MLRA was unglaciated during the Pleistocene Epoch. St. Lawrence Island is the most geologically complex of the islands in this area. The St. Lawrence Island coastal plain is dotted with numerous small- and medium-size lakes with a mosaic primarily composed of surficial deposits and volcanic and sedimentary rock, including coal beds and limestone. The highlands on this island are primarily composed of Cretaceous granitic bedrock except for Atuk Mountain which is composed of young volcanic bedrock from the Quaternary to late Tertiary. Nunivak and St. Matthew Islands are made up almost exclusively of early and late Tertiary and Quaternary volcanic rocks.

These islands are in the zone of discontinuous permafrost. Frozen soils are common across the vast extents of rolling plains and gentle sloping highlands. In these areas, the layer of permafrost is generally thin or moderately thick and occurs primarily in fine textured deposits. Permafrost generally does not occur on flood plains, in coarse textured sediments on the slopes of volcanic cones and other highlands, along the coast, or near lakes and other bodies of water. Common periglacial features include solifluction lobes, frost boils, and palsen (Swanson et al. 1986, USDA 2022).

The majority of soils are acidic, and the dominant soil order is Gelisols. Except for some non-acidic uplands on St. Lawrence Island, the vast majority of soil substrate across the MLRA is acidic (pH less than 5.5) (CAVM Team 2023). The Gelisols are shallow or moderately deep to permafrost (10 to 40 inches) and are typically very poorly to poorly drained. Common Gelisol suborders are Histels, Orthels, and Turbels. The Histels have thick accumulations of surface organic material and primarily occur in very wet coastal plain depressions and low-gradient drainageways. The Orthels and Turbels have comparably thinner surface organic material and primarily occur on the coastal lowlands and other areas with gentle slopes. The MLRA also has small areas of Andisols, Entisols, Inceptisols, and Mollisols. Andisols and Inceptisols primarily occur on volcanic cones and other slopes with coarse textured, acidic soils. Mollisols occur on areas with limestone on St. Lawrence Island (USDA 2022). Entisols primarily occur on flood plains and estuaries. Miscellaneous (non-soil) areas make up about 10 percent of the area and are primarily water, lava flows, rubble composed of volcanic rock, and beach sediments.

Climate

The presence of sea ice in the Bering Sea strongly influences the climate across the islands in this area. Sea ice in the Bering Sea historically forms in early December, increases in thickness until late April, and breaks apart in June (Zuesler 1941). When sea ice is absent, the Bering Sea and North Pacific Ocean moderate diurnal and monthly temperatures resulting in a maritime climate. As sea ice forms around the islands, temperatures decrease significantly with the area shifting to a continental climate.

Vegetation

Tidal flats and estuaries support sedge dominant communities, while drier beach dune communities support American dunegrass and seacoast angelica communities (Swanson et al. 1986). The coastal lowlands and nearly level to rolling plains have a mosaic of sedge and moss dominant wetlands and various tundra. The tundra often has dwarf shrubs like crowberry; tussock forming and non-tussock forming sedges; and a variety of forbs, lichen, and mosses. Very wet drainages and the shores of lakes support wet sedge meadows. Drier soils on flood plains commonly support low to tall willow scrub with dense grasses and forbs in the understory. Shallow soils with coarse textured rocks common on volcanic cones, mountain slopes, and ridges commonly support alpine dwarf scrub dominated by ericaceous shrubs, Dryas, and dwarf willows. These communities commonly have a considerable amount of lichen and bare ground. Bedrock exposures and barrens with lichens and scattered shrubs and herbs in pockets of fine earth dominate the highest elevations, ridges, and other windblown sites.

Introduced ungulates

Introduced herds of reindeer and muskox provide a rich history of land use across the Northern Bering Sea Islands MLRA. Of the many islands in this MLRA, Nunivak was the only island historically grazed by ungulates. Inhabited by caribou until the late 1800’s, the caribou on Nunivak Island were extirpated with the introduction of rifles (Griffin 2001).
Reindeer were introduced to St. Lawrence Island as early as 1901 (Jackson 1902), Nunivak Island in 1920, and St. Matthew Island in 1944 (Swanson and Barker 1991). Muskox were introduced to Nunivak Island in 1930 (ADFG 2024). Nunivak Island currently has managed herds of reindeer and muskox, St. Lawrence Island currently has managed herds of reindeer, and St. Matthew Island currently has no herds of reindeer. Some small islands in this MLRA are believed to have no history of natural or introduced ungulate herds (e.g. Pinnace Islands, Hall Island, and Punuk Islands).

LRU notes

There are two distinct bioclimates in this MLRA resulting in slight differences in vegetation. St. Lawrence Island is more than 200 miles North of Nunivak and St. Matthew Islands. As a result, St. Lawrence Island is significantly colder. Mean annual air temperatures on Nunivak and St. Matthew Islands typically range from 30 to 34 degrees Fahrenheit and are between 24 to 28 degrees Fahrenheit on St. Lawrence Islands (PRISM 2018). More southerly islands in this area fall into the Circumpolar Arctic Vegetation Mapping (CAVM) subzone E and more northerly islands fall into CAVM subzone D (CAVM 2022). Moist and dry tundra common to the near level to rolling plains across the islands are thought to support plant communities with similar species but have different plant community structures. Subzone E supports low shrub communities and subzone D erect dwarf shrub communities (CAVM 2022). At this time, these differences in community structure are recognized but unique ecological sites for each CAVM bioclimate subzone were not developed.

This area supports two life zones defined by the physiological limits of plant communities along an elevational gradient: arctic and alpine. In this MLRA, the arctic life zone occurs below 500 feet elevation on average (Swanson et al. 1986) and is the elevational band where lowland vegetation dominates. For this MLRA, certain vascular plant species are common in the lowlands and much less common in the alpine (i.e. Salix pulchra, Salix fuscescens, Betula nana, Ledum palustre ssp. decumbens, and Calamagrostis canadensis). Above the arctic band of elevation, alpine vegetation dominates. For this MLRA, certain vascular plant and lichen species are common in the alpine and much less common in the lowlands (i.e. Dryas octopetala ssp. octopetala, Diapensia lapponica var. obovata, Anthoxanthum monticola ssp. alpinum, Oxytropis nigrescens, Alectoria ochroleuca, and Flavocetraria nivalis). The lowlands also have much higher potential for lichen biomass yields compared to the alpine (Swanson et al. 1986). The transition between arctic and alpine vegetation can occur within a range of elevations, and is highly dependent on latitude, slope, aspect, and shading from adjacent mountains.

Classification relationships

Landfire BPS – 7217020-Alaska Arctic Wet Sedge-Sphagnum Peatland (Landfire 2009)
Wet Sedge Meadow Tundra (Viereck et. al 1992)
Sedge (Wet Lakebed) (Swanson et al. 1986)
Sedge (Breached Lakebed) (Swanson et al. 1986)

Ecological site concept

This arctic ecological site occurs on lake margins, breached lakebeds, and other large depressions in the MLRA with wet and peaty soils that do not have permafrost. Associated soils pond frequently, have a high-water table throughout the growing season, and are considered very poorly drained. A typical soil profile has 31 to 55 inches of peat over silty mineral soils.

The presence of introduced ungulate herds on Nunivak, St Lawrence, and St. Matthews Islands, in some places for over a century, plays an integral role in shaping vegetation across this MLRA. Islands in this MLRA without a history of introduced reindeer and muskox herds are associated with reference state vegetation, while islands with introduced herds are associated with grazing state vegetation.

One plant community has been documented within the grazing state for this ecological site. This community is characterized as wet sedge meadow tundra (Viereck et al. 1992) with the dominant plant being water sedge. Other commonly observed species include tealeaf willow, bluejoint, purple marshlocks, and Sphagnum moss. The vegetative strata that characterize this community are medium graminoids (between 4 and 24 inches in height) and moss.

Associated sites

R239XY054AK	**Arctic Sedge Peat Frozen Drainageways** Occurs in gentle sloping drainageways on coastal plains. Ecological site 54 commonly drains the depressional landforms associated with ecological site 57.

Similar sites

R239XY052AK	**Arctic Sedge Loamy Frozen Slopes** While ecological sites 52 and 57 are characterized as wet sedge meadow tundra (Viereck et al. 1992) there are differences in the kinds and amounts of dominant vegetation. Site 52 has different shrubby and graminoid dominant plants.
R239XY054AK	**Arctic Sedge Peat Frozen Drainageways** While ecological sites 54 and 57 are characterized as wet sedge meadow tundra (Viereck et al. 1992) there are differences in the kinds and amounts of dominant vegetation. Site 54 has different shrubby and graminoid dominant plants.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Carex aquatilis* (2) *Eriophorum angustifolium*

Physiographic features

This ecological site is associated with depressions on coastal plains and plains. On Nunivak Island, additional associated landforms were identified as lake margins, shallow lake beds, and breached lake beds (Swanson et al. 1986). Elevation typically occurs between 10 and 30 feet but can go as high as 500 feet or more in certain areas on St. Lawrence Island. Slopes are nearly level and occur on all slope aspects. Associated depressions are commonly connected by drainageways that bring seasonal flooding, which occurs frequently for short durations of time. Ponding generally occurs frequently for long durations of time with ponding depth ranging between 0 and 12 inches. During the growing season, a water table commonly occurs at the soil surface. This site generates negligible runoff to adjacent, downslope ecological sites.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Depression (2) Plains > Depression (3) Coastal plain > Lakebed (4) Coastal plain > Lakebed (5) Coastal plain > Lakeshore
Runoff class	Negligible
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Frequent
Ponding duration	Long (7 to 30 days)
Ponding frequency	Frequent
Elevation	3–9 m
Slope	0–2%
Ponding depth	0–30 cm
Water table depth	0 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding duration	Long (7 to 30 days)
Flooding frequency	Frequent
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Not specified
Elevation	3–661 m
Slope	Not specified
Ponding depth	Not specified
Water table depth	Not specified

Climatic features

Sea ice strongly influences the climate of the islands in MLRA 239X. For the Northern Bering Sea Islands, sea ice starts forming in December and often persists through early June. In the absence of sea ice, the Bering Sea and North Pacific Ocean moderate diurnal and monthly temperatures resulting in a maritime climate. Summer temperatures (June through August) are relatively stable with mean maximum monthly temperatures ranging between 50 to 55 degrees Fahrenheit. As sea ice forms around the islands, temperatures decrease significantly with the area shifting to a continental climate. The coldest months (January through March) have mean monthly minimum temperatures ranging from 4 to 6 degrees Fahrenheit. The extent, thickness, and duration of the Bering Sea ice appears to be in flux resulting in southerly storms that can bring significantly warmer winter monthly temperatures (Stabeno et al. 2018, Gramling 2019).

The Northern Bering Sea Islands have summers that are short and cool and winters that are long and cold. Strong winds are common throughout the year. Mean annual air temperatures typically range from 26 to 32 degrees Fahrenheit with Saint Lawrence Island (mean annual air temperatures between 24 to 28 degrees Fahrenheit) being significantly colder compared to Nunivak and Saint Michael Islands (mean annual air temperatures between 30 to 34 degrees Fahrenheit) (PRISM 2018). The warmest months are June, July, and August. During these summer months, the typical freeze free period for the area ranges from 94 to 111 days. The coldest months are January, February, and March.

This area is semi-arid with mean annual precipitation typically ranging between 14 and 17 inches. The warmest months have overcast skies with frequent fog and precipitation while the coldest months have clear skies. The two wettest months are August and September where the islands typically receive a quarter of the annual precipitation. The rest of the months receive similar amounts of precipitation. Saint Michael Island receives greater mean annual precipitation (between 17 and 21 inches) compared to Nunivak and Saint Lawrence Islands (between 13 to 17 inches) (PRISM 2018). The average annual snowfall ranges from about 50 to 80 inches (USDA 2022) with the highest snowfall occurring during the months spanning November through March (USDA 1986).

Table 4. Representative climatic features

Frost-free period (characteristic range)	51-75 days
Freeze-free period (characteristic range)	94-111 days
Precipitation total (characteristic range)	356-432 mm
Frost-free period (actual range)	50-85 days
Freeze-free period (actual range)	93-117 days
Precipitation total (actual range)	330-457 mm
Frost-free period (average)	64 days
Freeze-free period (average)	103 days
Precipitation total (average)	381 mm

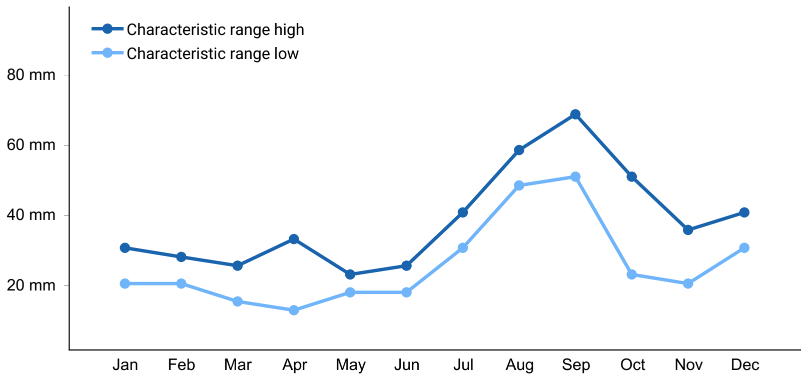


Figure 1. Monthly precipitation range

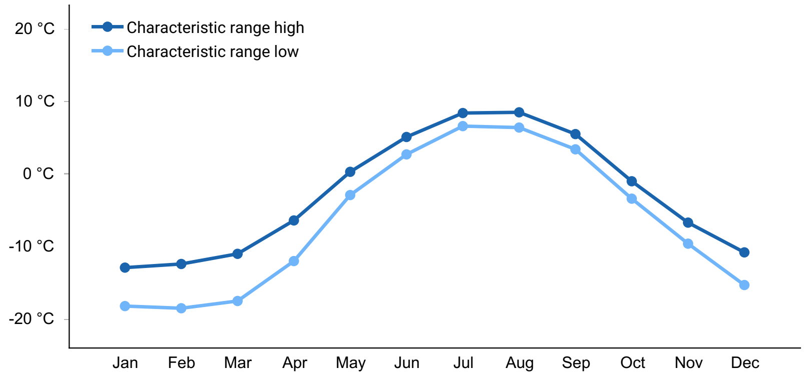


Figure 2. Monthly minimum temperature range

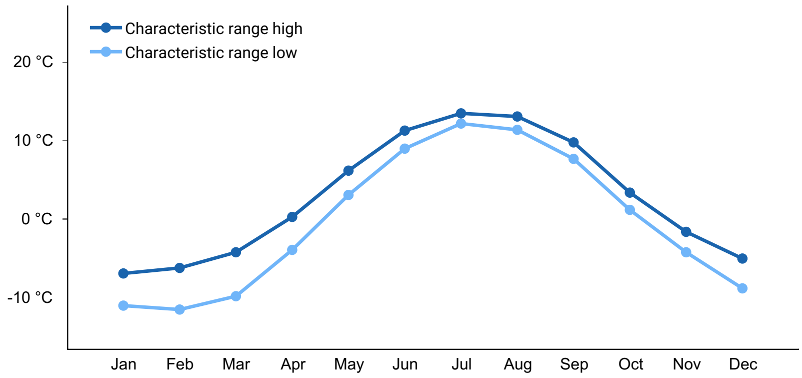


Figure 3. Monthly maximum temperature range

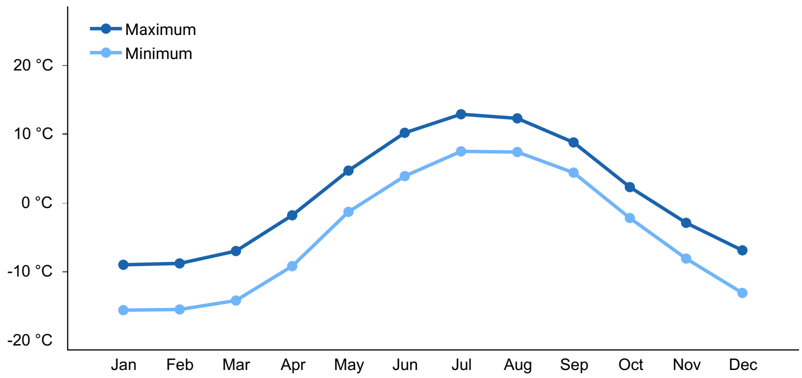


Figure 4. Monthly average minimum and maximum temperature

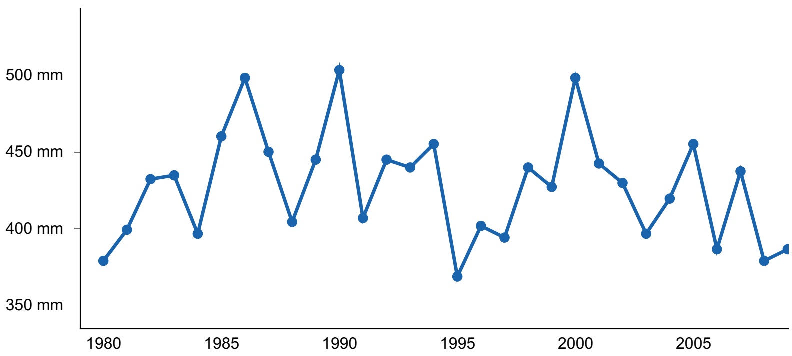


Figure 5. Annual precipitation pattern

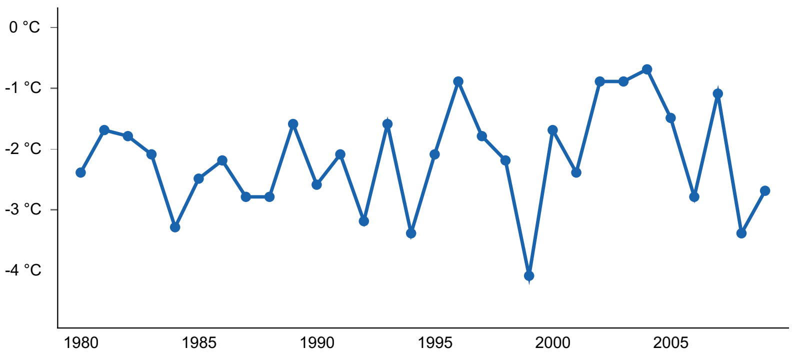


Figure 6. Annual average temperature pattern

Climate stations used

- (1) NOME MUNI AP [USW00026617], Nome, AK
- (2) WALES [USW00026618], Wales, AK
- (3) BETHEL AP [USW00026615], Bethel, AK

Influencing water features

This site is classified as a Depressional wetland under the Hydrogeomorphic (HGM) classification system (Smith et al. 1995; USDA-NRCS 2008). In the associated depressions, precipitation, overland flow, or interflow are the main sources of water (Smith et al. 1995).

Depth to the water table may decrease following summer storm events or spring snowmelt and increase during extended dry periods.

Wetland description

n/a

Soil features

Soils formed in a thick layer of peat. Rock fragments do not occur on the soil surface. Soils are capped with 31 to 55 inches of saturated organic material. The mineral soil below the organic material is variable and is commonly composed of silt loams, very fine sands, and silty clay loams. These mineral horizons have rock fragments ranging between 0 and 9 percent of the soil profile by volume. These soils are typically very deep without restrictions. The pH of the soil profile is often very strongly acidic to moderately acidic. The soils are wet for long portions of the growing season and are considered very poorly drained.

Table 5. Representative soil features

Parent material	(1) Organic material
Surface texture	(1) Peat
Family particle size	(1) Loamy
Drainage class	Very poorly drained
Permeability class	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)	27.69–51.05 cm
Calcium carbonate equivalent (25.4-101.6cm)	0%
Clay content (0-50.8cm)	0%
Electrical conductivity (25.4-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (25.4-101.6cm)	0–3
Soil reaction (1:1 water) (25.4-101.6cm)	4.9–6
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	Not specified

Permeability class	Not specified
Depth to restrictive layer	51 cm
Soil depth	Not specified
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	24.64–56.9 cm
Calcium carbonate equivalent (25.4-101.6cm)	0–1%
Clay content (0-50.8cm)	Not specified
Electrical conductivity (25.4-101.6cm)	Not specified
Sodium adsorption ratio (25.4-101.6cm)	Not specified
Soil reaction (1:1 water) (25.4-101.6cm)	3.8–7.8
Subsurface fragment volume <=3" (0-152.4cm)	0–9%
Subsurface fragment volume >3" (0-152.4cm)	Not specified

Ecological dynamics

The Northern Bering Sea Islands MLRA (MLRA 239X) occurs in the arctic where the harsh climate limits the composition and structure of plant communities. This area has cool and short summers and long and cold winters. Limited warmth during the short summer months, inhibits trees from occurring, and the expansive tundra is composed of a mosaic of low growing shrubs, sedges, moss, and lichen. The cold temperatures limit the vertical and horizontal structure of shrubs and other functional groups of the tundra (CAVM 2022). For instance, shrubs do not typically exceed 80 cm in height across these islands (Swanson et al. 1986; CAVM 2022). The exception is micro-climates where snow can accumulate, which protects vegetation from harsh winds and insulates soils. These micro-climates allow for shrubs to grow much taller and occur on landforms such as flood plains.

Lake Systems

This ecological site occurs on the margins of deep lakes, in shallow lake beds, and breached lakes (Swanson et al. 1986). While the soils of the coastal plains that surround these lakes have permafrost, the soils under and directly adjacent to lakes are commonly unfrozen (USDA 2022). During years of high lake water volume, adjacent frozen soils can thaw and cause ground subsidence. Under these conditions, outlets can form and lead to the lake partially or completely draining. Vegetation along lake margins, in breached lakes, and in shallow lake beds all had similar sedge meadow vegetation (Swanson et al. 1986).

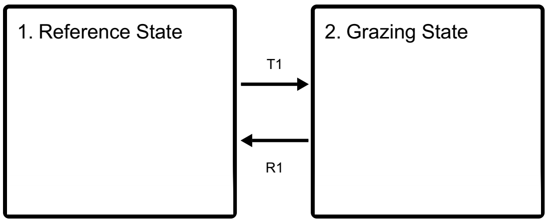
Ungulate History and Use

In this MLRA, the lack of predators paired with quality forage can lead to dramatic population growth of reindeer which in turn can lead to significant die-offs. Eighty-one reindeer were introduced to Nunivak Island in 1920. Due to a lack of predators and an abundance of high-quality forage, the reindeer population climbed to peaks of greater than 30 thousand in 1944 and 23 thousand in 1965 (Swanson and Barker 1991). After each peak in population, the reindeer herds experienced dramatic population die offs that resulted in less than 5 thousand animals (Swanson and Barker 1991). These die offs are largely attributed to lichen range depletion. Lichen forage makes up 47 percent of the March diet for reindeer herds on Nunivak Island (Swanson et al. 1986) so the depletion of lichen range can directly lead to stress and mortality of reindeer populations.

The presence of introduced ungulate herds on Nunivak, St Lawrence, and St. Matthews Islands, in some places for over a century, plays an integral role in shaping vegetation across this MLRA. Some small islands in this MLRA are believed to have no history of natural or introduced ungulate herds (e.g. Pinnace Islands, Hall Island, and Punuk Islands). On islands with introduced herds, grazing by reindeer and/or muskox has impacted the potential natural vegetation. For instance, continuous grazing of slow growing fruticose lichen can lead to changes in lichen species composition (Swanson and Barker 1991) and can lead to increases in shrub and bryophyte cover (Kautz et al. 1992). Because of the mixed history in grazing in this MLRA, the STM for this ecological site has two states. Islands in this MLRA without a history of ungulate herds are associated with reference state vegetation, while islands with introduced ungulate herds are associated with grazing state vegetation.

State and transition model

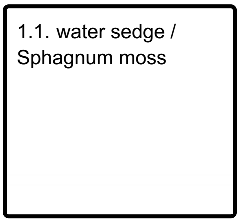
Ecosystem states



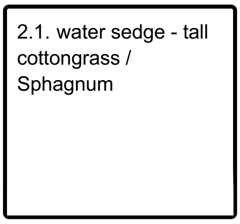
T1 - Human introduction of reindeer and/or muskox to islands

R1 - Long periods of time after extirpation of human introduced ungulates

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The historic and current use of introduced ungulates in this MLRA may have altered the potential natural vegetation on these islands. Islands in this MLRA without a history of introduced grazing have reference state vegetation, while islands with introduced herds of reindeer and/or muskox (Nunivak, St. Lawrence, and St. Matthews Islands) have grazing state vegetation. Currently no data has been collected in areas of this MLRA in reference condition. Future targeted data collection efforts can address whether range in excellent condition within the grazing state is similar to reference state vegetation and these results could dramatically alter this provisional state and transition model.

Dominant plant species

- water sedge (*Carex aquatilis*), grass
- sphagnum (*Sphagnum*), other herbaceous

Community 1.1
water sedge / Sphagnum moss

Community 1.1 is the potential natural vegetation for this state. It is characterized as wet sedge meadow tundra (Viereck et al. 1992) with water sedge the dominant herbaceous plant. Other common species include Sphagnum moss.

Dominant plant species

- water sedge (*Carex aquatilis*), grass
- sphagnum (*Sphagnum*), other herbaceous

State 2
Grazing State

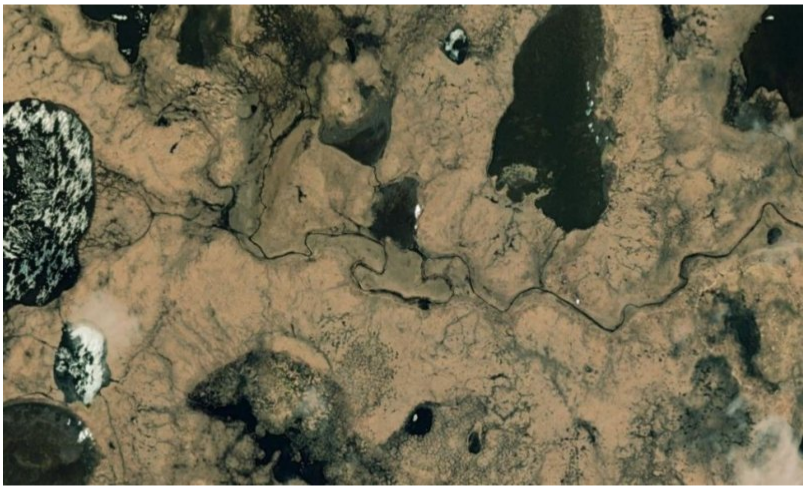


Figure 7. Aerial image of drainageways and lakes on St. Lawrence Island. This ecological site occurs on lake margins, shallow lakebeds, and breached lakes.

Figure 8. A breached lake near Mekoryuk on Nunivak Island.

One plant community has been documented within the grazing state. The data for this state is based on a mixture of recent field work conducted on Nunivak Island (2022-2023) and a historical range survey conducted on Nunivak Island (Swanson et al. 1986). Future work will be required to determine if the vegetation on Nunivak Island represent the vegetation across the grazed islands of this MLRA.

Dominant plant species

- water sedge (*Carex aquatilis*), grass
- tall cottongrass (*Eriophorum angustifolium*), grass

Community 2.1
water sedge - tall cottongrass / Sphagnum

Figure 9. A typical plant community in a breached lake on Nunivak Island.

Figure 10. A lake margin community on Nunivak Island.

One plant community has been documented within the grazing state for this ecological site. This community is characterized as wet sedge meadow tundra (Viereck et al. 1992) with the dominant plant being water sedge. Other commonly observed species include Alaska bog willow, tall cottongrass, purple marshlocks, field horsetail, and Sphagnum moss. The vegetative strata that characterize this community are medium graminoids (between 4 and 24 inches in height) and moss.

Forest understory. Live lichen and moss annual production cannot be measured accurately due to a lack of information on growth rates and/or slow annual growth rates. Lichen and moss biomass data below refers to total biomass, while vascular plants biomass refers to annual production.

Sphagnum moss was occasionally identified as Sphagnum girgensohnii and S. squarrosum.

Dominant plant species

- Alaska bog willow (*Salix fuscescens*), shrub
- water sedge (*Carex aquatilis*), grass
- tall cottongrass (*Eriophorum angustifolium*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous
- Girgensohn's sphagnum (*Sphagnum girgensohnii*), other herbaceous
- sphagnum (*Sphagnum squarrosum*), other herbaceous

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Moss	2242	3923	5604
Grass/Grasslike	762	1216	1670
Shrub/Vine	90	146	196
Forb	45	73	101
Lichen	–	–	–
Total	**3139**	**5358**	**7571**

Table 8. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-10%
Grass/grasslike foliar cover	25-75%
Forb foliar cover	5-15%
Non-vascular plants	50-75%
Biological crusts	0%
Litter	50-75%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0-5%
Bare ground	0%

Table 9. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-10%	–	–
>0.15 <= 0.3	–	–	–	–
>0.3 <= 0.6	–	0-5%	25-75%	5-15%
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Transition T1
State 1 to 2

Human introduction of reindeer and/or muskox to islands

Restoration pathway R1
State 2 to 1

Long periods of time after extirpation of human introduced ungulates

Additional community tables

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Shrub Annual Production**			90–196	
	Alaska bog willow	SAFU	*Salix fuscescens*	73–235	–
	oval-leaf willow	SAOV	*Salix ovalifolia*	0–22	–
Grass/Grasslike					
2	**Graminoid Annual Production**			762–1670	
	shortstalk sedge	CAPO	*Carex podocarpa*	314–785	–
	water sedge	CAAQ	*Carex aquatilis*	224–689	–
	tall cottongrass	ERAN6	*Eriophorum angustifolium*	90–275	–
	white cottongrass	ERSC2	*Eriophorum scheuchzeri*	0–22	–
Forb					
3	**Forb Annual Production**			45–101	
	field horsetail	EQAR	*Equisetum arvense*	9–62	–
	purple marshlocks	COPA28	*Comarum palustre*	9–62	–
Moss					
4	**Total Bryophyte Biomass**			2242–5604	
	sphagnum	SPHAG2	*Sphagnum*	1681–5492	–
	warnstorfia moss	WAEX	*Warnstorfia exannulata*	0–168	–
Lichen					
5	**Total Lichen Biomass**			–	

Animal community

The principal use of this site by wildlife is feeding for a variety of shorebirds and waterfowl. Brant, emperor geese, turnstones, and sandhill cranes commonly use this site for nesting and feeding, while a large variety of other bird species may forage and rest in these areas. Muskoxen also use this site in addition to reindeer, especially during the summer to escape from oestrid flies; the coastal breezes can provide escape from these insects.

Hydrological functions

N/A

Recreational uses

N/A

Wood products

No wood products available from this site.

Other products

Reindeer Grazing

This site is suited for all seasons; however, it is best suited for spring and summer range. Growing grasses and sedges produce high levels of digestible protein. Browse also provides forage during the fall and early winter. Green portions of sedges may be grazed during the winter and this site can provide one of the few sources of high-quality green feed during the winter. Insect harassment is high on warm summer days.

Other information

These interpretive narratives were all developed in a report for range sites on Nunivak Island (Swanson et al. 1986).

Inventory data references

Tier 2 sampling plots used to develop the reference state. Plot numbers as recorded in NASIS with associated community phase.

Community 2.1

2023AK050009

Plant species and production information are based on a historic range survey on Nunivak Island (Swanson et al. 1986).

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Approval

Marji Patz, 2/18/2025

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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	05/13/2025
Approved by	Marji Patz
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:

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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:**
