USDA Natural Resources Conservation Service

Ecological site R245XY401AK
Arctic polygon complex

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Accessed: 01/31/2026

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): 245X–Arctic Foothills

The Arctic Foothills MLRA (MLRA 245X) includes the broad, rounded hills and nearly level uplands at the northern base of the Brooks Range from Point Hope, in the west, to Demarcation Point, in the east. It makes up about 45,565 square miles. Periglacial features occur throughout the area. The area is entirely undeveloped wildland and is sparsely populated. It is in the zone of continuous permafrost. MLRA 245X has boundaries based on physiography with MLRAs 242X, 243X, 244X, and 246X. MLRA 242X (Northern Seward Peninsula-Selawik Lowlands), near Kivalina Lagoon, is distinguishable by nearly level to rolling plains, river deltas, and extended mountain footslopes. MLRA 243X (Western Brooks Range Mountains), encompasses the southern slopes of the De Long Mountains, the Baird Mountains, the Noatak River drainage, and the lower Kobuk River drainage. MLRA 244X (Northern Brooks Range Mountains) has steep, rugged, high mountains and narrow valleys. MLRA 246X (Arctic Coastal Plain) has a level to gently rolling plain along the coast of the Arctic Ocean. MLRA 245 also is bordered by the Chukchi Sea.

Land ownership:
MLRA 245X encompasses the northernmost portions of the Noatak National Preserve, Gates of the Arctic National Park, and the Arctic National Wildlife Refuge (ANWR).
The Noatak National Preserve is located along the Noatak River Corridor. The Noatak River is the nation’s largest unaltered river basin, and the preserve is around 6.5 million acres. 5.7 million acres of the preserve is designated as wilderness. The Noatak River is also a designated National Wild and Scenic River.
Gates of the Arctic National Park is the northernmost national park in the United States, situated entirely north of the Arctic Circle. The area of the park and preserve is the second

largest in the US at 8,472,506 acres, second only to Wrangell-St. Elias National Park and Preserve. The park features six Wild and Scenic Rivers.
The Arctic National Wildlife Refuge (ANWR) is a 19,286,772-acre wildlife refuge located in northeastern Alaska. It is the largest wildlife refuge in the country. The ANWR is home to a diverse range of endemic mammal species and hundreds of species of migratory birds.
The majority of MLRA 245 is managed by the BLM, USFWS, and the State of Alaska. The BLM manages 17,027,543 acres, around 58 percent of the MLRA. The USFWS manages 4,650,388 acres, around 16 percent of the MLRA, and the State of Alaska has a patent on 10,375,908 acres of the MLRA, around 36 percent of the MLRA.

Climate:

Brief, cool summers and long, very cold winters characterize the arctic climate of the Arctic Foothills MLRA. The average annual precipitation ranges 11.9 and 12.8 inches. Average annual snowfall ranges from about 40 to 60 inches. The average annual temperature ranges from 12 to 29 degrees Fahrenheit. The average freeze-free period is between 10 and 55 days.

Geology:

This MLRA remained unglaciated during the Pleistocene Epoch, except possibly for the upper areas along the edge of the Northern Brooks Range Mountains MLRA. Bedrock and coarse to fine rubble cover the surface of convex uplands. Elsewhere, Quaternary surface deposits include various alluvial, eolian, or glaciofluvial materials. Slightly modified to highly modified moraines and drift occur in areas adjacent to the Brooks Range. The bedrock geology consists primarily of Cretaceous and Late Paleozoic to Lower Mesozoic stratified sedimentary rocks or uplifted Cretaceous and Tertiary continental deposits.

Soils:
The dominant soil order within this MLRA is Gelisols with Inceptisols covering a comparatively minor extent. These Gelisols are shallow or moderately deep to permafrost and are typically poorly to very poorly drained. Miscellaneous (nonsoil) areas make up about 6 percent of this area and are primarily rock outcrop, talus, and ice.
Gelisols are soils that have permafrost within 100 cm of the soil surface and/or have gelic materials within 100 cm of the soil surface and have permafrost within 200 cm. Gelic materials are mineral or organic soil materials that have evidence of cryoturbation (frost churning) and/or ice segregation in the active layer (seasonal thaw layer) and/or the upper part of the permafrost (NRCS 2024). The common suborders of Gelisols within this MLRA are Turbels, Histels, and Orthels.
The Histels have thick accumulations of surface organic material and are associated with high-center polygons. The Orthels and Turbels have comparably thinner surface organic material and occur on high floodplains, stream terraces, low-center polygons, and the slopes of hills and plains. Turbels show signs of cryoturbation while Orthels do not.
Inceptisols lack permafrost and are soils that have altered horizons that have lost bases or iron and aluminum but retain some weatherable minerals. They do not have an illuvial

horizon enriched with either silicate clay or with an amorphous mixture of aluminum and organic carbon (NRCS 2024). The common suborder of Inceptisols in this MLRA are Gelepts, which are associated with dry and gravelly soils on the slopes of hills and plains.

Vegetation dynamics:

The hills and plains in this MLRA support dwarf scrub vegetation dominated by Dryas, black crowberry, and dwarf willow communities. On shallow, rocky soils and exposed landforms, lichens and scattered herbs dominate the ground layer. On more mesic soils, sedges, forbs, and mosses cover most of the surface. The mesic and deeper soils in valleys and basins and on terraces generally support low and dwarf willow and ericaceous shrub scrub and mesic graminoid herbaceous communities, commonly with extensive areas of tussock-forming sedges. Depressions, drainageways, and other saturated sites support wet sedge meadows and wet sedge-moss meadows. Flood plains support a mixture of tall and low scrub dominated by various willows, shrub birch, and some alder.

Classification relationships

Landfire Biophysical Settings – 6717080 – Alaska Arctic Polygonal Ground Shrub-Tussock Tundra (Landfire 2009)

Landfire Biophysical Settings – 6717080 – Alaska Arctic Polygonal Ground Wet Sedge Tundra (Landfire 2009)

Viereck communities:

Tussock tundra – III.A.2.d (Viereck et al. 1994)

Ecological site concept

• Arctic climate
• Associated landforms low- and high center polygons in valleys
• Soils are derived from organic material, silty eolian deposits, and silty cryoturbate
• Soils are considered very poorly drained
• Soils have permafrost ranging between 12 and 39 inches
• The reference plant community is characterized as a tussock tundra (Viereck et al 1992) with the dominant plants being tussock cottongrass, Bigelow’s sedge, dwarf birch, and tealeaf willow.

Associated sites

R245XY403AK	**Arctic scrub gravelly slopes** Ecological site 403 is found on non-wetland soils on slopes on plains. While it shares similar vegetation with the center of high-center polygons of ecological site 401, ecological site 403 is not associated with ice wedge polygons and lacks the mosaic of vegetation found at ecological site 401.
R245XY402AK	**Arctic scrub gravelly frozen slopes** Ecological site 402 is found on similar landscapes as ecological site 401, slopes on plains, but ecological site 402 does not have massive ice wedges present and does not have any vegetation overlap with ecological site 401.

Similar sites

R245XY201AK	**Arctic tussock gravelly frozen slopes** Ecological site 401 is a complex of ecological sites with a mosaic of vegetation that is associated with low- and high-center polygonal ground. While the center of high-center polygons share similar tussock dominated vegetation, ecological site 201 is not associated with ice-wedge polygons and lacks a similar mosaic of vegetation and soils.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Betula nana* (2) *Salix pulchra*
Herbaceous	(1) *Eriophorum vaginatum* (2) *Carex bigelowii*

Physiographic features

The arctic polygon ecological site complex occurs on high- and low-center polygons in valley flats. Polygonal complexes occur as a result of massive ice wedges forming and degrading in cracks in the ground. Elevation ranges between 20 and 4750 feet. Slope is negligible to gently sloping on valley floors. This ecological site occurs on all aspects, showing no preference for north-facing or south-facing aspects. Flooding does not occur at this site. This ecological site has a water table at the soil surface for long periods of the growing season. Ice-wedge troughs pond frequently for very long durations of time while high-center polygon centers do not pond at all. The ponding depth ranges from two to eight inches above the soil surface.

Table 2. Representative physiographic features

Landforms	(1) Valley > Patterned ground > Low-center polygon (2) Valley > Patterned ground > High-center polygon
Runoff class	Medium

Ponding duration	Very brief (4 to 48 hours) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	67–625 m
Slope	0–4%
Ponding depth	5–20 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Ponding duration	Not specified
Ponding frequency	Not specified
Elevation	6–1,448 m
Slope	Not specified
Ponding depth	Not specified

Climatic features

The arctic climate of MLRA 245X is characterized by brief, cool summers and long, very cold winters. The average annual precipitation ranges between 11 and 14. The average annual snowfall ranges from about 40 to 60 inches. The average annual temperature ranges from 10 to 20 degrees Fahrenheit. The average freeze-free period ranges between 39 and 82 days.

Table 4. Representative climatic features

Frost-free period (characteristic range)	19-44 days
Freeze-free period (characteristic range)	39-82 days
Precipitation total (characteristic range)	305-330 mm
Frost-free period (actual range)	3-65 days
Freeze-free period (actual range)	18-98 days
Precipitation total (actual range)	279-356 mm
Frost-free period (average)	33 days
Freeze-free period (average)	59 days
Precipitation total (average)	305 mm

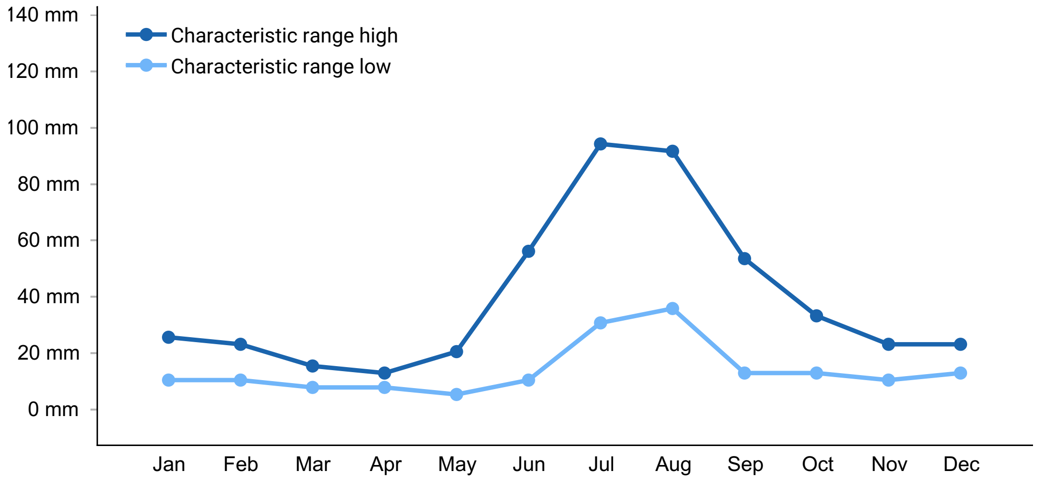


Figure 1. Monthly precipitation range

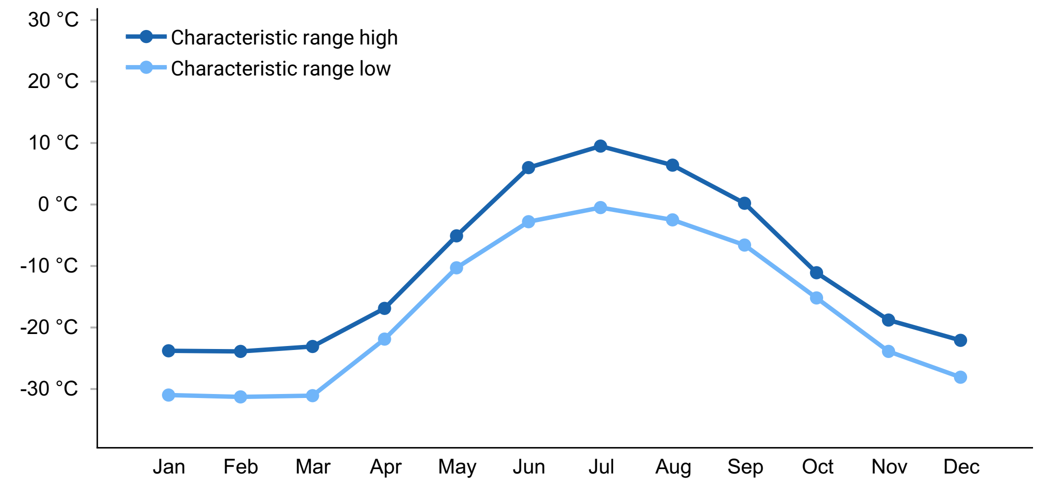


Figure 2. Monthly minimum temperature range

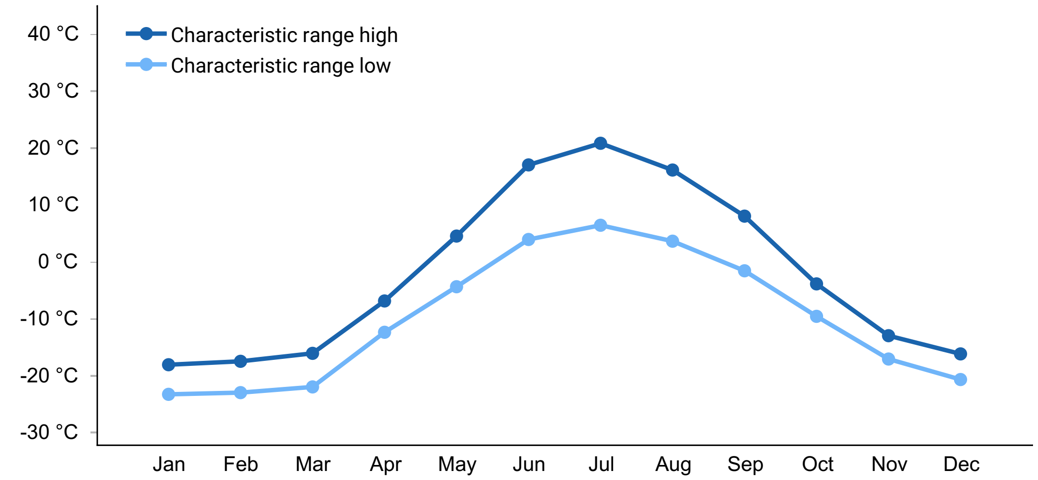


Figure 3. Monthly maximum temperature range

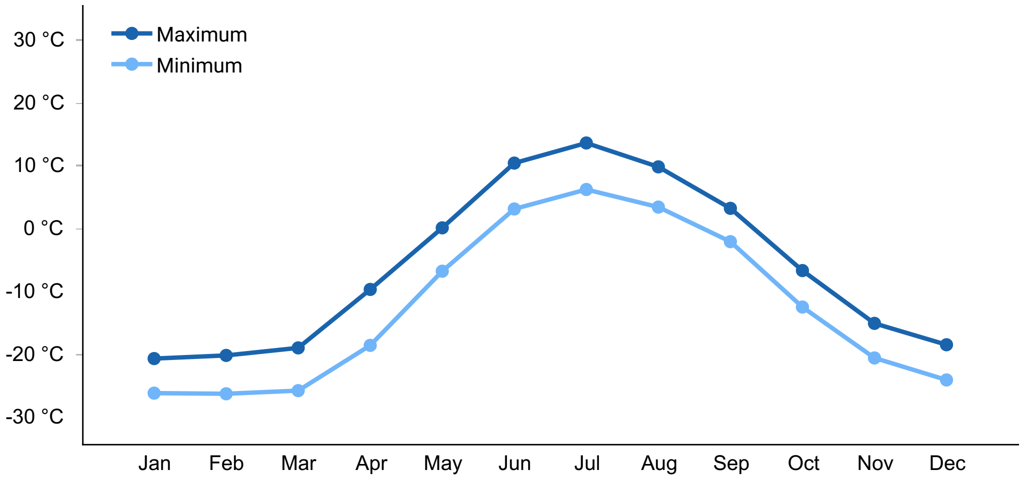


Figure 4. Monthly average minimum and maximum temperature

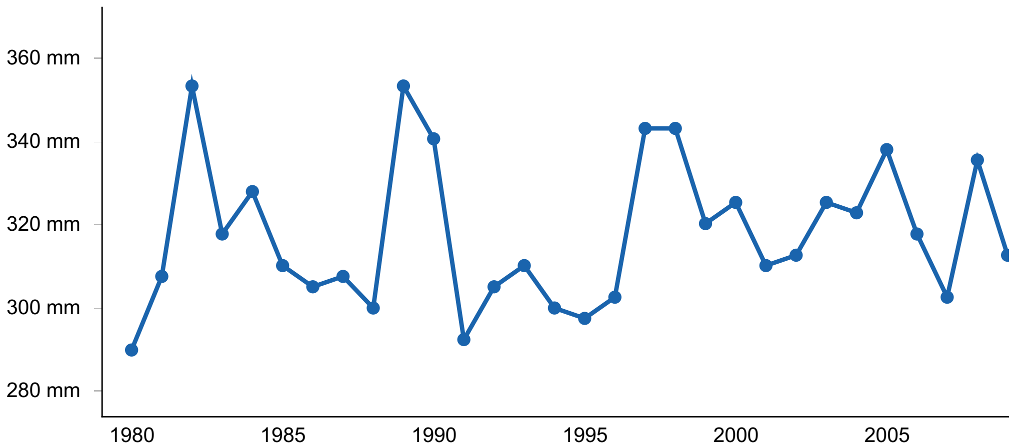


Figure 5. Annual precipitation pattern

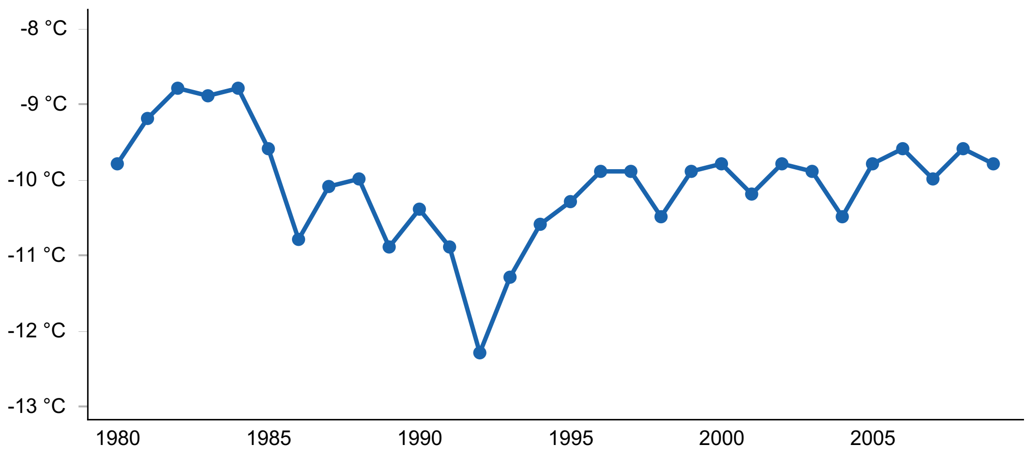


Figure 6. Annual average temperature pattern

Influencing water features

Organic soil flats or extensive peatlands occur commonly on flat interfluves but may also be located where depressions have become filled with peat to form a relatively large flat surface. Water source is dominated by precipitation, while water loss is by saturation overland flow and seepage to underlying ground water. Raised bogs share many of these characteristics but may be considered a separate class because of their convex upward form and distinct edaphic conditions for plants. Portions of the Everglades and northern Minnesota peatlands are common examples of organic soil flat wetlands.

Wetland description

This ecological site is classified as an organic soil flat under the Hydrogeomorphic (HGM) classification system (Smith et al. 1995; USDA-NRCS 2008).

Soil features

• Soils formed in eolian deposits and silty cryoturbate.
• Rock fragments do not occur on the soil surface.
• The surface mineral horizon is a mucky silt loam formed from eolian deposits or silty cryoturbate that lacks rock fragments.
• This silty soil horizon is thin. Soils are very deep.
• Permafrost is a restriction that occurs from 12 to 39 inches.
• The pH of the soil profile ranges from very strongly acidic to moderately acidic.
• These are wet soils that are considered very poorly to poorly drained.

Table 5. Representative soil features

Parent material	(1) Cryoturbate (2) Eolian deposits
Surface texture	(1) Peat
Family particle size	(1) Loamy
Drainage class	Very poorly drained to poorly drained
Permeability class	Moderately rapid
Depth to restrictive layer	30–99 cm
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	14.99–52.83 cm
Clay content (0-50.8cm)	0–5%
Electrical conductivity (25.4-101.6cm)	0–1 mmhos/cm
Sodium adsorption ratio (0-25.4cm)	0–3

Subsurface fragment volume <=3" (0-152.4cm)	0%
Subsurface fragment volume >3" (0-101.6cm)	0%

Ecological dynamics

This ecological site 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 2003).

Ice-wedge polygons

The soils in the arctic reach extremely cold temperatures in the winter resulting in thermal contraction and ground cracking. During the winters of 1950 and 1951 in Utqiagvik, soil temperatures ranged between -13 to 5 degrees Fahrenheit and at the coldest temperature a 65-foot block of soil would contract approximately 0.75 inches (Black 1952). Soil contraction at extremely cold temperature results in incredible stress that is relieved through cracking of the soil profile. At first, the ground cracks in a random pattern (Kerfoot 1972). In subsequent winters, secondary cracks typically occur at orthogonal angels which eventually lead to a field of patterned, polygonal ground (Lachenbruch 1962; Kerfoot 1972). The first polygons on the ground are large (35 to 325 feet) but subsequent soil cracking result in smaller polygonal divisions (15 to 25 feet) (Black 1952).

During spring snowmelt, these soil cracks fill with water that immediately freeze which mark the start of an ice wedge. Continued ground contraction and cracking and snowmelt filling and freezing within these cracks results in the growth of ice wedges. As the ground warms each summer, the ice wedges are comparatively more rigid than the surrounding soils. The result is the ice wedge block is heaved upward and/or the adjacent soils move along the side of the ice (Leffingwell 1915), action results in a bulge in the once flat ground. After centuries of continued ice wedge growth, a low-center polygon is expressed on the landscape. A well-developed low-center polygon has a center that is depressed relative to its boundary. Ice wedge, low-center polygons have three distinct microtopographic positions: ice-wedge trough, adjacent rim, and the low-center of the polygon.

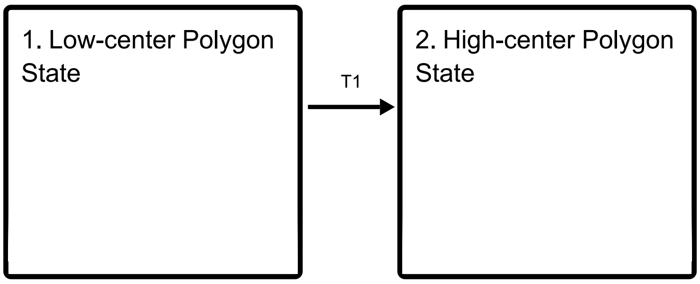
Low-center polygons transition to high-center polygons over varying timescales. A well expressed high-center polygon has a raised center relative to its boundary and has two distinct microtopographic positions: domed center and ice-wedge trough. The transition from low- to high-center polygon can result from multiple combined processes (Black 1952). Fist, thermal erosion of the ice wedge can cause the low-center rim to subside or collapse. Second, infilling of the low-center polygon with organic or mineral soil material from vegetative growth, soil creep, and windblown soil deposition. Each process ultimately results in the once concave-shaped depression associated with low-center polygons now being a flat- to convex-shaped dome associated with high-center polygons. The transition from low- to high-center polygons can naturally take hundreds to thousands of years (Jorgenson and Shur 2007), this transition is greatly hastened due to climate change and anthropogenic ground disturbances (Billings and Peterson 1980, Jorgenson et al. 2006, Liljedahl et al. 2016).

Ecological Site Complex

Each of the polygon microtopographic positions previously described represents a unique ecological site that was combined into a complex. The microtopographic positions associated with low- and high-center polygons each have unique and at times even wide-ranging differences in soil and site properties. For instance, the trough of high-center polygons can be perennially ponded while the center of high-center polygons might not pond at all. These large differences in soil and site properties result in each microtopographic position being associated with different kinds and amounts of vegetation. This was done for two reasons. First, these ecological sites all occur in association on the same polygons, which are relatively small. Second, the soils and plant communities on these polygons are all tied together and change as the ice-wedge grows or deteriorates. Having the ecological sites combined into a complex best illustrates how soils and vegetation change with disturbance to the ice-wedge polygon.

State and transition model

Ecosystem states



State 1 submodel, plant communities

1.1. water sedge - tall cottongrass / Limprichtia moss - Sphagnum moss

1.2. dwarf birch - lingonberry / Bigelow's sedge - tussock cottongrass / splendid feather moss - turgid Aulacomnium moss

1.3. water sedge - tall cottongrass / Sphagnum moss

State 2 submodel, plant communities

2.1. lingonberry - marsh Labrador tea / Bigelow's sedge - tussock cottongrass

2.2. water sedge - tall cottongrass / Sphagnum moss

State 1
Low-center Polygon State

This state relates to low-centered ice wedge polygon, which are polygon whose center is depressed relative to its boundary. There are three associated plant communities related to polygon microtopography in this state: low-center of the polygon (community 1.1), adjacent rim (community 1.2), and the ice wedge trough (community 1.3). The polygon center and trough are often perennially ponded with shallow water and supports a wet graminoid herbaceous community dominated by various sedges. The polygon center is surrounded by a raised rim that supports open low scrub communities dominated by scrub birch, various ericaceous scrubs, willow, and various sedges. The depth of ponded water in the polygon center likely plays a critical role in plant species composition but was not accounted for during development of this provisional state and transition model.

Community 1.1
water sedge - tall cottongrass / Limprichtia moss - Sphagnum moss

Community 1.1 occurs in the center of low-center polygons in shallow lake basins. Soils have permafrost and are ponded for very long durations. This community is characterized as wet sedge meadow tundra (Viereck et al. 1992) with the dominant plants being water sedge, tall cottongrass, Limprichtia moss, and Sphagnum moss.

Dominant plant species

- water sedge (*Carex aquatilis*), grass
- tall cottongrass (*Eriophorum angustifolium*), grass
- round sedge (*Carex rotundata*), grass
- creeping sedge (*Carex chordorrhiza*), grass
- rock sedge (*Carex saxatilis*), grass
- Chamisso's cottongrass (*Eriophorum chamissonis*), grass
- looseflower alpine sedge (*Carex rariflora*), grass
- limprichtia moss (*Limprichtia revolvens*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous
- meesia moss (*Meesia triquetra*), other herbaceous
- yellow marsh saxifrage (*Saxifraga hirculus*), other herbaceous

Community 1.2
dwarf birch - lingonberry / Bigelow's sedge - tussock cottongrass / splendid feather moss - turgid Aulacomnium moss

Community 1.2 occurs on the rim of the low-center polygons in shallow lake basins. Soils have permafrost and are ponded for very long durations. This community is characterized as mixed shrub-sedge tussock tundra (Viereck et al. 1992) with the dominant plants being dwarf birch, lingonberry, tealeaf willow, Bigelow's sedge, tussock cottongrass, marsh Labrador tea, splendid feathermoss, and turgid Aulacomnium moss.

Dominant plant species

- dwarf birch (*Betula nana*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- white arctic mountain heather (*Cassiope tetragona*), shrub
- red fruit bearberry (*Arctostaphylos rubra*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- Bigelow's sedge (*Carex bigelowii*), grass
- tussock cottongrass (*Eriophorum vaginatum*), grass
- water sedge (*Carex aquatilis*), grass
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- turgid aulacomnium moss (*Aulacomnium turgidum*), other herbaceous
- dicranum moss (*Dicranum*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous
- cloudberry (*Rubus chamaemorus*), other herbaceous
- (*Flavocetraria cucullata*), other herbaceous

Community 1.3
water sedge - tall cottongrass / Sphagnum moss

Community 1.3 occurs in the ice wedge trough of low-center polygons in shallow lake basins. Soils have permafrost and are ponded for very long durations. This community is characterized as wet sedge meadow tundra (Viereck et al. 1992) with the dominant plants being water sedge, tall cottongrass, and Sphagnum moss.

Dominant plant species

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

State 2
High-center Polygon State

This state relates to high-centered ice wedge polygon and these are polygon whose center is raised relative to its boundary. There are two associated plant communities related topolygon microtopography in this state: domed center of the polygon (community 1.1) and ice wedge trough (community 1.2). The troughs are often perennially ponded with shallow waterand supports a wet graminoid herbaceous community dominated by various sedges. The polygon dome supports ericaceous dwarf scrub communities dominated by lingonberry, marshLabrador tea, various sedges, and various moss.

Community 2.1
lingonberry - marsh Labrador tea / Bigelow's sedge - tussock cottongrass

Community 2.1 occurs on the dome of high-center polygons in shallow lake basins. Soils have permafrost and are ponded for brief durations. This community is characterized as ericaceous dwarf scrub (Viereck et al. 1992) with the dominant plants being lingonberry, marsh Labrador tea, dwarf birch, white arctic mountain heather, Bigelow's sedge, tussock cottongrass, and various moss. While tussock forming sedge species are present, tussocks are not typically well developed.

Dominant plant species

- lingonberry (*Vaccinium vitis-idaea*), shrub
- marsh Labrador tea (*Ledum palustre*), shrub
- dwarf birch (*Betula nana*), shrub
- white arctic mountain heather (*Cassiope tetragona*), shrub
- entireleaf mountain-avens (*Dryas integrifolia*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- netleaf willow (*Salix reticulata*), shrub
- Bigelow's sedge (*Carex bigelowii*), grass

- tussock cottongrass (*Eriophorum vaginatum*), grass
- turgid aulacomnium moss (*Aulacomnium turgidum*), other herbaceous
- dicranum moss (*Dicranum*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- meadow bistort (*Polygonum bistorta*), other herbaceous
- whiteworm lichen (*Thamnolia vermicularis*), other herbaceous

Community 2.2
water sedge - tall cottongrass / Sphagnum moss

Community 2.2 occurs in the ice wedge trough of high-center polygons in shallow lake basins. Soils have permafrost and are ponded for very long durations. This community is characterized as wet sedge meadow tundra (Viereck et al. 1992) with the dominant plants being water sedge, tall cottongrass, and Sphagnum moss.

Dominant plant species

- water sedge (*Carex aquatilis*), grass
- tall cottongrass (*Eriophorum angustifolium*), grass
- wideleaf polargrass (*Arctagrostis latifolia*), grass
- tussock cottongrass (*Eriophorum vaginatum*), grass
- sphagnum (*Sphagnum*), other herbaceous

Transition T1
State 1 to 2

thermal erosion of ice wedges

Context dependence. Thermal erosion of ice wedges and/or infilling of low-center results in the transformation of low-center polygon to high-center polygon. This is a natural process that can take thousands of years. Climate change and anthropogenic disturbances to associated soils can much more rapidly cause thermal erosion of ice wedges and cause this transformation.

Additional community tables

Animal community

Mammals common to the area include brown bear, wolf, wolverine, caribou, Arctic fox, snowshoe hare, tundra hare, hoary marmot, brown lemming, and northern bog lemming. Musk oxen, which were decimated by hunting in the late 1800s, are becoming more common in many places. Common birds include willow ptarmigan, rough-legged hawk, American golden plover, short-eared owl, and snowy owl. Arctic char and Arctic grayling are in most of the rivers.

Recreational uses

Local residents use this area primarily for subsistence hunting, fishing, and gathering. Sport hunting, fishing, and gathering. Sport hunting and other kinds of wildland recreation are becoming increasingly important. Most visitors are served by air taxi, guiding, and outfitting companies' operation out of the major Alaska communities. Most of the communities in the area are along the major rivers at the lower elevations or are on the coast.

Gates of the Arctic National Park, the ANWR, and the Noatak National Preserve are all partially located in MLRA 245. Gates of the Arctic NP is the least visited national park in the United States and has no formal infrastructure or trails.

Other products

Some limited extraction of minerals, including oil and gas, occurs only locally.

Inventory data references

The vegetation modeled for this site has limited data and is considered provisional. The associated model was largely developed from NRCS staff with working knowledge of the area and literature review.

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Contributors

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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	01/31/2026
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:

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17. **Perennial plant reproductive capability:**
