

Ecological site R243XY402AK

Arctic scrub gravelly frozen slopes

Last updated: 5/29/2025

Accessed: 03/28/2026

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): 243X–Western Brooks Range Mountains, Foothills, and Valleys

Boundaries and important features:

The Western Brooks Range Mountains, Foothills, and Valleys MLRA (MLRA 243X) encompasses the southern slopes of the De Long Mountains, the Baird Mountains, the Noatak River drainage, and the lower Kobuk River drainage. The southern limit of the area includes the western Lockwood Hills, Sheklukshuk and Waring Mountains, and Kiana and Igichuk Hills. MLRA 243 makes up 22,705 square miles. This MLRA shares boundaries with MLRAs 242X, 244X, and 245X. MLRA 242X (Northern Seward Peninsula-Selawik Lowlands) has nearly level to rolling plains, river deltas, and extended mountain footslopes. MLRA 244X (Northern Brooks Range Mountains) has steep, rugged, high mountains and narrow valleys. MLRA 245X (Arctic Foothills) has broad, rounded hills and nearly level uplands at the base of the Brooks Range. MLRA 243X shares a less apparent boundary with MLRAs 233 (Upper Kobuk and Koyukuk Hills and Valleys) and 234X (Interior Brooks Range Mountains), where a continental subarctic climate prevails.

Kobuk Valley National Park is located in the south-central portion of MLRA 243X, along the Kobuk River. Kobuk Valley National Park has an area of around 1.75 million acres and was designated to preserve the 100 ft high Great Kobuk Sand Dunes and the surrounding area which includes the Onion Portage caribou migration route. The Noatak National Preserve is located in the north-central portion of the MLRA, 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 are designated as wilderness. The Noatak River is also a designated National Wild and Scenic River.

The Red Dog Mine is located in the northwestern portion of the MLRA. The Red Dog Mine is the world's largest producer of zinc and has the world's largest zinc reserves. The mine is the primary economic driver of the Northwest Arctic Borough. The Northwest Arctic Borough was formed in 1986 on the economic basis of taxing the mine.

Geology:

The entire area was glaciated during the Early and Middle Pleistocene, except for possibly small portions of the Baird Mountains. By the Late Pleistocene, glaciers had retreated from most of the area, except for the central, upper-elevation portions of the De Long Mountains in the northern part of the MLRA. The valley of the upper Noatak River was likely covered by extensive proglacial lakes during parts of the Pleistocene Epoch. In the mountains, glacial deposits have eroded away or been buried by mountain colluvium and alluvium, which accumulated during the Holocene Epoch across about 60 percent of the present landscape.

Glacial moraines, drift, and outwash deposits are extensive on the lower mountain slopes and in valleys at the mid and lower elevations. These deposits cover about 18 percent of the MLRA. Flood plains, stream terraces, and alluvial fans have recent and Pleistocene fluvial deposits. The underlying bedrock geology consists almost entirely of stratified sedimentary rocks of Paleozoic and Precambrian age and, in some cases, Cretaceous age.

This area is in the zone of continuous permafrost. In the mountains, permafrost is most evident in unconsolidated materials. In the valleys, thick layers of permafrost occur in both fine textured and coarse textured materials. Depth to the base of the permafrost layer may be 1,000 feet (305 meters) or more. In close proximity to water bodies, it may be 600 feet (185 meters) or more. Periglacial features, such as pingos, thermokarst pits, thaw lakes, solifluction lobes, and high- and low-center polygons, are common on-stream terraces, on the lower mountain slopes, and in swales on foothills.

Soils:

The dominant soil orders in this MLRA are Gelisols, Entisols, Inceptisols, and Mollisols. The soils in the area have a gelic soil temperature regime and an aquic or udic soil moisture regime. The Gelisols are shallow or moderately deep to permafrost, occur on fine to gravelly textured sediments, and are very poorly to moderately well drained. Common Gelisol suborders are Histels, Orthels, and Turbels. The Histels have thick accumulations of surface organic material and occur in depressions, lake margins, and shallow basins. The Orthels and Turbels have comparably thinner surface organic material with the Turbels being cryoturbated. These widespread soils occur on slopes of mountains, hills, and plains across the MLRA. Inceptisols (suborder Gelepts), Mollisols (suborder Gelolls), and Entisols (suborder Gelents) occur on upper mountain slopes and ridges formed in loamy to stony colluvium and residuum. These soils are shallow to deep and are generally

well drained. Entisols (suborder Cryofluvents) on flood plains formed in stratified loamy, sandy, and gravelly alluvium and are somewhat poorly to well drained.

Vegetation Dynamics:

The mountain slopes and ridges in this area generally support dwarf scrub dominated by *Dryas*, ericaceous shrubs including crowberry, and dwarf willow. Lichens and scattered herbs dominate the ground layer on shallow, rocky soils and exposed sites. There are extensive areas of bare soil and bedrock. On the more mesic sites, sedges, forbs, and mosses cover most of the surface. Areas at the lower elevations and areas of the deeper soils on nearly level uplands, terraces, and basins generally support low willow and ericaceous shrub scrub and mesic graminoid herbaceous communities, commonly with extensive areas of tussock-forming sedges. 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 alder.

Climate:

Short, generally cool summers and long, very cold winters characterize the continental arctic climate of the area. The average annual precipitation ranges from about 10 to 15 inches (255 to 380 millimeters) at the lower elevations in the western part of this MLRA and along the central Noatak River and from about 20 to 40 inches (510 to 1,015 millimeters) in the mountains. The average annual snowfall is about 35 to 100 inches (90 to 255 centimeters). The average annual temperature ranges from about 8 to 16 degrees F (-13 to -9 degrees C). Snow and freezing temperatures can occur in any month of the year, particularly at the higher elevations.

LRU notes

This area supports two life zones defined by the physiological limits of plant communities along an elevational gradient: arctic lowlands and alpine. In this MLRA, the arctic lowland life zone typically occurs below 1000 feet elevation on average 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. *Betula nana*, *Salix pulchra*, *Ledum palustre*). Above the arctic lowlands 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*, *Saxifraga oppositifolia*, *Empetrum nigrum*). 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 Biophysical Settings – 6816821 - Alaska Arctic Scrub Birch-Ericaceous Shrubland – Infrequent fire (Landfire 2009)

Viereck Communities:

open low scrub mesic shrub birch-ericaceous shrub tundra– II.C.2.c (Viereck et al. 1992)

Ecological site concept

- Occurs on the flanks and base of mountains and on slopes of hills and plains. These slopes commonly have nonsorted circles.
- Associated with the arctic lowland life zone. Elevation commonly ranges between 20 and 1000 feet. Slopes are gentle to moderately steep and occur on all slope aspects.
- Soils are derived from silty loess over gravelly colluvium and/or till.
- Soils do not pond or flood.
- Soils are very deep with permafrost restrictions.
- The reference plant community is characterized as open low scrub mesic shrub birch-ericaceous shrub tundra (Viereck et al. 1992). Multiple plant communities occur within the reference state related to wildfire.
- Nonsorted circles have unique site and soil properties that result in a mosaic of vegetation. Circles are small microfeatures that can extend over large areas of mountain, hill, and plain slopes. These nonsorted circles have lichen dominant plant communities.
- Areas associated with nonsorted circles have moderately well drained soils with permafrost at moderate to deep depths. Areas not associated with nonsorted circles have poorly drained soils with permafrost at shallow to moderate depths.

Associated sites

| | |
|-------------|--|
| R243XY201AK | Arctic tussock gravelly frozen slopes Occurs on same hills and plains but on soils that pond and support tussock dominant plant communities. |
| R243XY401AK | Arctic scrub peat polygons Occurs on the same hills and plains but is associated with ice-wedge, high-center polygons. |

Similar sites

| | |
|-------------|---|
| R243XY401AK | Arctic scrub peat polygons Ecological site 401 occupies a similar ecological niche as 201, but occurs on polygonal ground that support a different mosaic of plant communities. |
|-------------|---|

Table 1. Dominant plant species

| | |
|-------|---|
| Tree | Not specified |
| Shrub | (1) <i>Betula nana</i> (2) <i>Vaccinium uliginosum</i> |

| | |
|------------|--|
| Herbaceous | (1) <i>Pleurozium schreberi</i> (2) <i>Hylocomium splendens</i> |
|------------|--|

Physiographic features

This arctic scrub lowland ecological site (R243XY402AK) occurs on the flanks and base of mountains and slopes of glaciated hills and plains. Nonsorted circles are common periglacial microfeatures. The diameter of nonsorted circles ranges from 1.5 to 10 feet and can be mounded well above the surrounding vegetation. Nonsorted circles have unique site and soil properties that result in a mosaic of vegetation. Representative elevation ranges between 20 and 1000 feet with this site occasionally occurring up to 1725 feet. Slopes are gentle to moderately steep and show no preference for north-facing or south-facing aspects. Flooding and ponding does not occur. Associated with very limited to limited amounts of runoff to adjacent, downslope ecological sites.

Reference State

- A seasonal water table occurs between 0 and 10 inches.

Nonsorted Circle State

- A seasonal water table occurs between 20 and 40 inches.



Figure 1. Nonsorted circles in the Interior Alaska Uplands MLRA . Nonsorted circles have unique site and soil properties that result in a mosaic of vegetation.

Table 2. Representative physiographic features

| | |
|--------------------------------|---------------------------------------|
| Geomorphic position, mountains | (1) Mountainflank (2) Mountainbase |
|--------------------------------|---------------------------------------|

| | |
|--------------------|--|
| Landforms | (1) Alluvial plain > Hill > Nonsorted circle (2) Alluvial plain > Plain > Nonsorted circle (3) Mountains > Mountain > Nonsorted circle |
| Runoff class | Very low to low |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 6–305 m |
| Slope | 2–20% |
| Water table depth | 0–25 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 | 6–526 m |
| Slope | Not specified |
| Water table depth | 0–102 cm |

Climatic features

MLRA 243X is characterized by an arctic continental climate having short, warm summers and long, cold, dark winters. The average annual mean temperature is 20.1 degrees Fahrenheit. The warmest months span June through August, with normal maximum temperature ranging from 57 to 61 degrees Fahrenheit. The coldest months are December through February, with normal minimum temperature ranging from -15 to -10 degrees Fahrenheit. This MLRA receives high annual precipitation with the summer months being the wettest. Average annual precipitation ranges from 9 to 32 inches. Approximately 40 percent of the annual precipitation occurs during the months of July through September.

Snow persists in the alpine and arctic lowland life zones throughout much of the year. A lack of trees and tall shrubs also means that this site is subject to strong winds, further exacerbating cold temperatures. This site has a much shorter growing season than sites in lower elevation areas and the growing season is significantly colder for associated vegetation.

Table 4. Representative climatic features

| | |
|--|------------|
| Frost-free period (characteristic range) | 55-85 days |
|--|------------|

| | |
|--|------------|
| Freeze-free period (characteristic range) | 40-70 days |
| Precipitation total (characteristic range) | 356-660 mm |
| Frost-free period (actual range) | 45-90 days |
| Freeze-free period (actual range) | 30-75 days |
| Precipitation total (actual range) | 229-813 mm |
| Frost-free period (average) | 69 days |
| Freeze-free period (average) | 54 days |
| Precipitation total (average) | 508 mm |

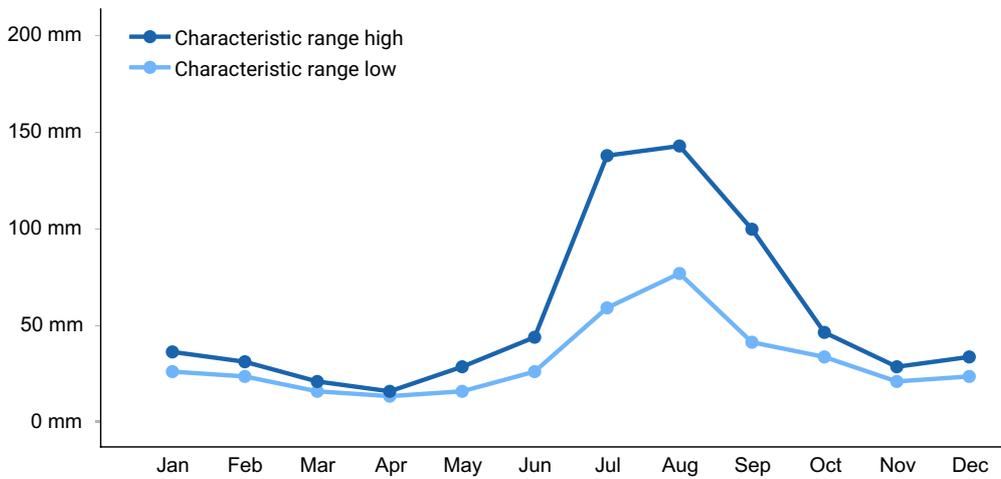


Figure 2. Monthly precipitation range

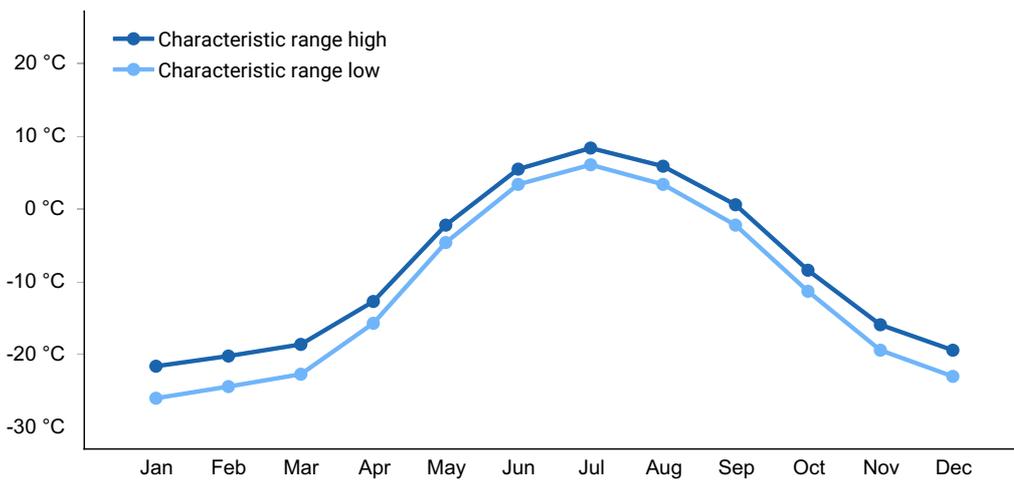


Figure 3. Monthly minimum temperature range

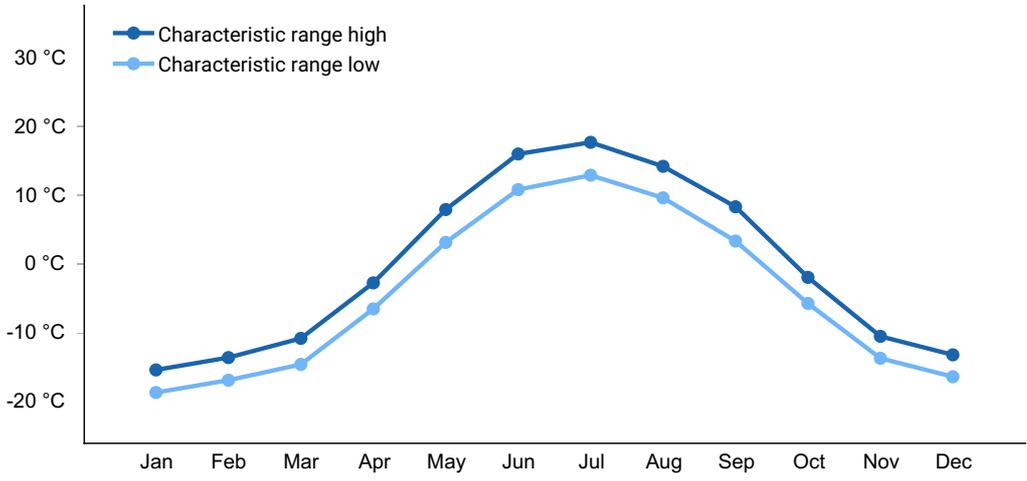


Figure 4. Monthly maximum temperature range

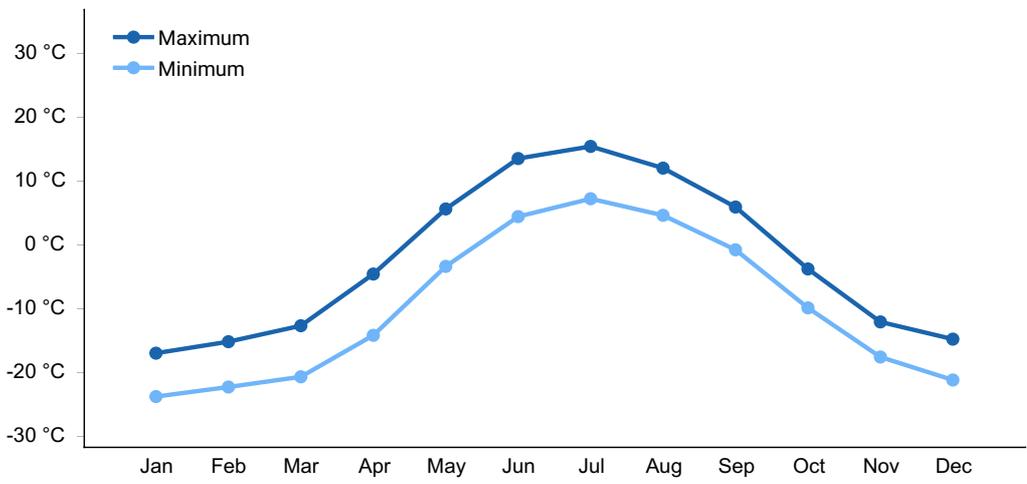


Figure 5. Monthly average minimum and maximum temperature

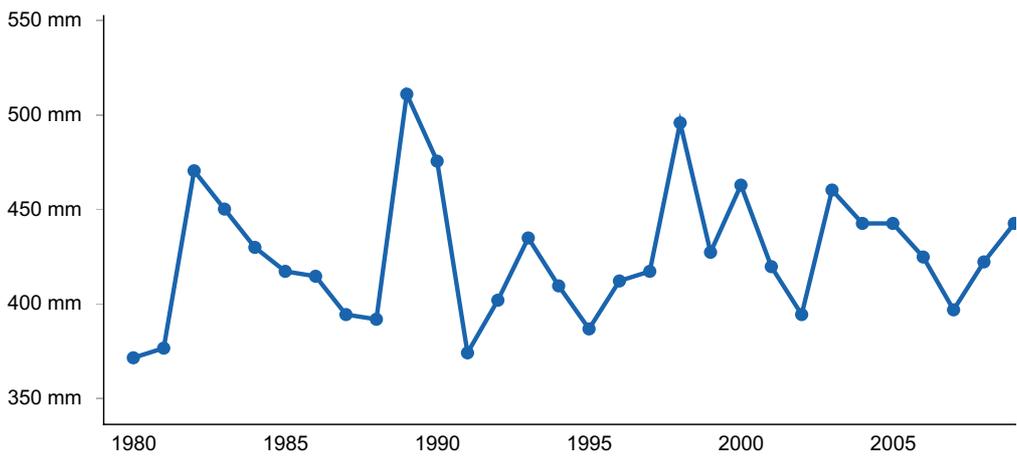


Figure 6. Annual precipitation pattern

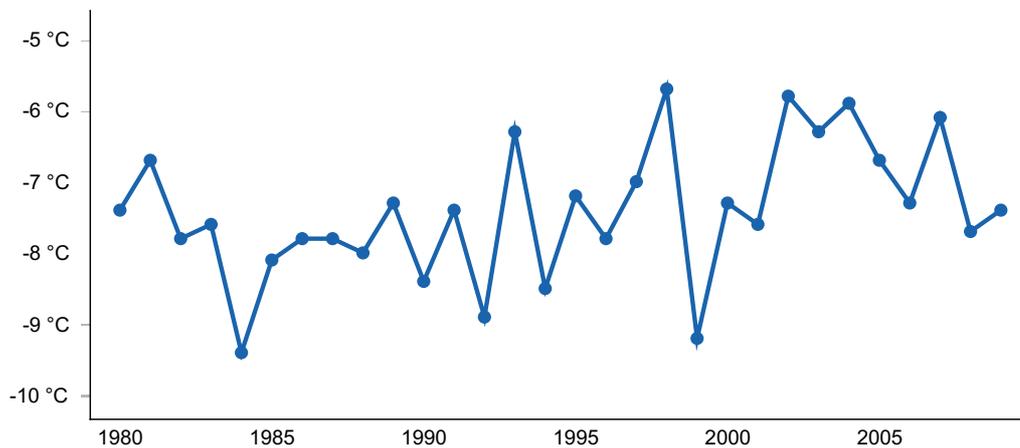


Figure 7. Annual average temperature pattern

Influencing water features

Slope wetlands are found where there is a discharge of ground water to the land surface and occur on sloping land; elevation gradients may range from steep hillsides to slight slopes. Slope wetlands are usually incapable of depressional storage because they lack the necessary closed contours. Principal water sources are ground water return flow and interflow from surrounding uplands, as well as precipitation. Hydrodynamics are dominated by downslope unidirectional water flow. Slope wetlands can occur in nearly flat landscapes if ground water discharge is a dominant source to the wetland surface. Slope wetlands lose water primarily by subsurface and surface flows and by evapo-transpiration. Slope wetlands may develop channels, but the channels serve only to convey water away from the slope wetland.

Wetland description

This ecological site is classified as a slope wetland under the Hydrogeomorphic (HGM) classification system (Smith et al. 1995; USDA-NRCS 2008).

Soil features

- Soils are derived from loess over gravelly colluvium and/or till.
- Rock fragments on the soil surface range between 0 and 15 percent cover.
- The surface mineral horizons are mucky silt loams or silt loams derived from silty loess or colluvium. This silty layer is very thin covering much gravellier mineral horizons.
- These gravelly soils have subsurface rock fragments ranging between 15 and 50 percent of the soil profile by volume.
- Soils are moderately acidic to slightly acidic.

Reference State Soils

- Capped with up to 11 inches of organic material.
- Permafrost restrictions occur at shallow depth (12 to 25 inches).

- These wet soils are considered poorly drained.

Nonsorted Circles State Soils

- Capped with up to one inch of organic material.
- Permafrost restrictions occur at moderate to deep depths (35 to 47 inches).
- Soils have strong contrasting textural stratification at very shallow to shallow depths (1 to 12 inches). This restriction does not perch water or impact the growth of vegetation.
- These moist soils are considered moderately well drained.

Table 5. Representative soil features

| | |
|---|--|
| Parent material | (1) Eolian deposits (2) Colluvium (3) Till |
| Surface texture | (1) Peat (2) Silt loam (3) Mucky silt loam |
| Family particle size | (1) Loamy-skeletal (2) Coarse-loamy |
| Drainage class | Poorly drained |
| Permeability class | Moderately rapid to rapid |
| Depth to restrictive layer | 30–119 cm |
| Soil depth | 152 cm |
| Surface fragment cover ≤3" | 0% |
| Surface fragment cover >3" | 0–1% |
| Available water capacity (0-101.6cm) | 9.4–14.22 cm |
| Calcium carbonate equivalent (0-25.4cm) | 0% |
| Clay content (0-50.8cm) | 5–10% |
| Electrical conductivity (25.4-101.6cm) | 0 mmhos/cm |
| Sodium adsorption ratio (0-101.6cm) | 0 |
| Soil reaction (1:1 water) (25.4-101.6cm) | 5.6–6.5 |
| Subsurface fragment volume ≤3" (0-152.4cm) | 20–25% |

| | |
|---|--------|
| Subsurface fragment volume >3" (0-152.4cm) | 10–15% |
|---|--------|

Table 6. Representative soil features (actual values)

| | |
|--|---|
| Drainage class | Poorly drained to moderately well drained |
| Permeability class | Not specified |
| Depth to restrictive layer | 3–119 cm |
| Soil depth | Not specified |
| Surface fragment cover <=3" | 0–7% |
| Surface fragment cover >3" | 0–14% |
| Available water capacity (0-101.6cm) | Not specified |
| Calcium carbonate equivalent (0-25.4cm) | Not specified |
| Clay content (0-50.8cm) | Not specified |
| Electrical conductivity (25.4-101.6cm) | Not specified |
| Sodium adsorption ratio (0-101.6cm) | Not specified |
| Soil reaction (1:1 water) (25.4-101.6cm) | 4.5–6.8 |
| Subsurface fragment volume <=3" (0-152.4cm) | 10–35% |
| Subsurface fragment volume >3" (0-152.4cm) | 5–15% |

Ecological dynamics

The Western Brooks Range MLRA (MLRA 243X) occurs in the arctic biome. This site is exposed to a variety of harsh environmental conditions. This area has cool, short summers and long 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. Ecological sites with greater than 25 percent lichen cover tend to be exposed to the wind and accumulate little winter snow (Viereck et al. 1992).

Nonsorted Circles

Nonsorted circles are a type of patterned ground. On gentle slopes, these patterned

features are roughly circular and as steepness increases these features become slightly elongated. In this area, the diameter of non-sorted circles commonly ranges from 1.5 to 10 feet and are mounded above the surrounding vegetation. These circles are considered nonsorted due to an absence of coarse rock fragments on their borders (Schoeneberger and Wysocki 2017). The formation of these nonsorted circles leads to a distinct mosaic of vegetation.

Non-sorted circles have distinct plant communities that are associated with different positions on the nonsorted circle. The first plant community occurs between the non-sorted circles (community 2.1) and generally resembles the reference plant community. Plant community 2.1 is classified as mesic shrub birch-ericaceous shrub (Viereck et al. 1992). The second plant community occurs on the nonsorted circle (community 2.2), which supports a dwarf scrub and lichen dominant plant community.

Fire patterns in the MLRA

Within this MLRA, fire is considered a natural and common event that typically goes unmanaged. Fire suppression is limited, and generally occurs in the southern part of the MLRA and along the Kobuk and Noatak river valleys. Most fires are caused by lightning strikes.

Between 1946 and 2021, there were 262 documented fires with perimeters totaling 1.4 million acres burned. Of those 262 fires, 154 were between 1 and 1000 acres, with the largest being around 210,000 acres.

Tundra fire regimes, like the ones found in MLRA 243, are poorly understood and rapidly changing. Tundra burning impacts vegetation composition, nutrient cycling, and permafrost dynamics (Racine et al 1987, 2004). Increasing evidence suggests that Arctic warming is affecting tundra fire regimes. In 2010, 37 fires burned 106,000 acres in the Noatak National Preserve, located within MLRA 243. This was the largest number of fires that have occurred in the area since record keeping began in 1950 (Jones et al 2009).

Changes in fuel characteristics associated with increased shrub growth and/or density due to warming over the past several decades (Racine et al 1987, 2004) may have contributed to the intensity of recent burns. There is also evidence to suggest that *Betula* shrubs have contributed to high levels of tundra burning in the past. This suggestion, in combination with studies documenting increased birch (*Betula* spp) abundance in early stage post-fire systems raises the possibility of a positive feedback loop between increased shrub density and increased tundra burning (Joly et al 2010).

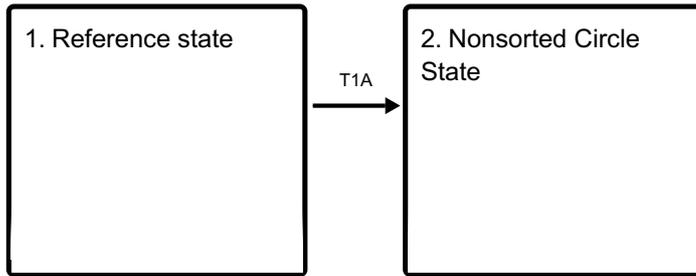
Fire Dynamics for this ecological site

While research indicates that the reference plant community is stable over time, fire is the main associated disturbance. There is estimated to be a mean fire return interval of around 600 years (Landfire 2009).

Bog blueberry, *Vaccinium uliginosum*, is one of the dominant species in this community. Bog blueberry is generally top killed by fire, while moderate to high severity fires may also kill underground vegetative structures that this plant uses to reestablish after a fire event. Bog blueberry sprouts from rhizomes or rootstocks following fire. It also roots in the organic material layer and therefore only survives in patches where the organic material is not consumed (FEIS 2024).

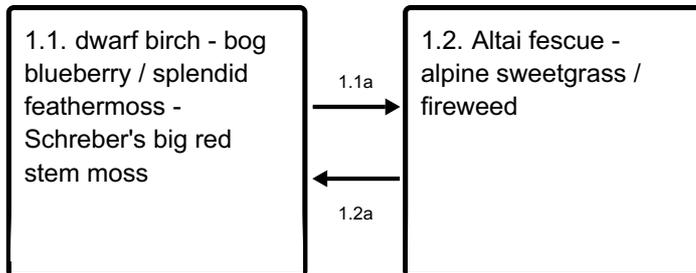
State and transition model

Ecosystem states



T1A - Formation of nonsorted circles

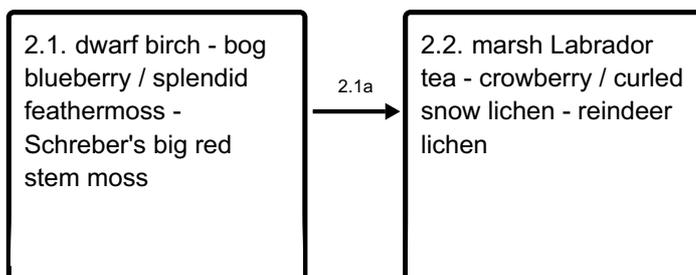
State 1 submodel, plant communities



1.1a - fire

1.2a - five years after wildfire disturbance

State 2 submodel, plant communities



2.1a - Formation of nonsorted circles.

State 1

Reference state

The reference plant community is open low mesic shrub birch-ericaceous shrub tundra (Vioreck et al. 1992). There are two plant communities within the reference state related to wildfire. All plant communities associated with the site have limited data, so the state-and-transition model is provisional.

Dominant plant species

- dwarf birch (*Betula nana*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous

Community 1.1

dwarf birch - bog blueberry / splendid feathermoss - Schreber's big red stem moss

This community is characterized as open low mesic shrub birch - ericaceous shrub tundra (Vioreck et al. 1992). Common plants include dwarf birch, bog blueberry, marsh Labrador tea, tealeaf willow, lingonberry, crowberry, various feathermoss and lichens. Vegetative strata with the highest cover are low shrubs, dwarf shrubs, and moss (Landfire 2009).

Dominant plant species

- dwarf birch (*Betula nana*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- marsh Labrador tea (*Ledum palustre* ssp. *decumbens*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- wideleaf polargrass (*Arctagrostis latifolia*), grass
- arctic bluegrass (*Poa arctica*), grass
- Bigelow's sedge (*Carex bigelowii*), grass
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous
- reindeer lichen (*Cladina*), other herbaceous
- felt lichen (*Peltigera*), other herbaceous
- marsh fleabane (*Senecio congestus*), other herbaceous

Community 1.2

Altai fescue - alpine sweetgrass / fireweed

Plant community 1.2 is in the earliest stage of wildfire-induced secondary succession. Common plants include dwarf birch, bog blueberry, Labrador tea, Altai fescue, alpine sweetgrass, bluejoint, and fireweed. Fire reduces total shrub cover and increase forb,

grass, and weedy moss cover (Landfire 2009).

Dominant plant species

- dwarf birch (*Betula nana*), shrub
- marsh Labrador tea (*Ledum palustre* ssp. *decumbens*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- Altai fescue (*Festuca altaica*), grass
- alpine sweetgrass (*Anthoxanthum monticola* ssp. *alpinum*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- pohlia moss (*Pohlia*), other herbaceous
- ceratodon moss (*Ceratodon purpureus*), other herbaceous

Pathway 1.1a

Community 1.1 to 1.2

A fire sweeps through and incinerates much of the above ground vegetation. Because of the associated cold and wet soils, this site commonly experiences low-severity fires. Minimal proportions of the organic mat are removed. The pre-fire vegetation reestablishes from below ground root systems and rhizomes

Pathway 1.2a

Community 1.2 to 1.1

Community pathway 1.2a occurs roughly 5 years after wildfire disturbance (Landfire 2009). Low shrubs including dwarf birch, tealeaf willow, various ericaceous shrubs, and feathermoss gain dominance in the plant community structure.

State 2

Nonsorted Circle State

Non-sorted circles are a type of patterned ground. On gentle slopes, these patterned features are roughly circular and as steepness increases these features become slightly elongated. In this area, the diameter of non-sorted circles commonly ranged from 1.5 to 10 feet and are mounded above the surrounding vegetation. These circles are considered nonsorted due to an absence of coarse rock fragments on their borders (Schoeneberger and Wysocki 2017). For this ecological site, these non-sorted patterned ground features form through the process of cryoturbation. Cryoturbation is a collective term used to describe all soil movements due to frost action, characterized by folded, broken and dislocated beds and lenses of unconsolidated deposits (Schoeneberger and Wysocki 2017). In this instance, these patterned ground features result through differential heave of frost susceptible material resulting in mounds (Schoeneberger and Wysocki 2017). During active periods of cryoturbation, freshly churned up mineral soil and rock fragments were

commonly observed on mounded surfaces. The formation of these nonsorted circles leads to a distinct mosaic of vegetation. This vegetation mosaic has two distinct plant communities that are associated with different positions on or adjacent to the nonsorted circle. The first plant community occurs in adjacent areas that have not yet formed these nonsorted circles or is the community that occurs between the nonsorted circles (community 2.1). This community generally resembles the reference state vegetation. The second plant community occurs on the nonsorted circle (community 2.2), which supports a lichen dominant plant community. When compared to community 2.1 soils, the non-sorted circle soils are much drier and have much less organic matter.

Dominant plant species

- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- (*Flavocetraria cucullata*), other herbaceous
- reindeer lichen (*Cladina*), other herbaceous

Community 2.1

dwarf birch - bog blueberry / splendid feathermoss - Schreber's big red stem moss

This community is characterized as open low mesic shrub birch - ericaceous shrub tundra (Vioreck et al. 1992). Common plants include dwarf birch, bog blueberry, marsh Labrador tea, tealeaf willow, lingonberry, crowberry, various feathermoss and lichens. Vegetative strata with the highest cover are low shrubs, dwarf shrubs, and moss (Landfire 2009).

Dominant plant species

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- lingonberry (*Vaccinium vitis-idaea*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- wideleaf polargrass (*Arctagrostis latifolia*), grass
- arctic bluegrass (*Poa arctica*), grass
- Bigelow's sedge (*Carex bigelowii*), grass
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous
- reindeer lichen (*Cladina*), other herbaceous
- felt lichen (*Peltigera*), other herbaceous
- marsh fleabane (*Senecio congestus*), other herbaceous

Community 2.2

marsh Labrador tea - crowberry / curled snow lichen - reindeer lichen

Community 2.2 is characterized as ericaceous dwarf scrub (Viereck et al. 1992) with the dominant vegetation being curled snow lichen and various reindeer lichen. Other common species include crowberry, marsh Labrador tea, scrub birch, bog blueberry, lingonberry, and Bigelow's sedge. The vegetative strata that characterize this community are dwarf shrubs (less than 8 inches) and foliose and fruticose lichen. The soil surface is primarily covered with lichen but can at times have significant amounts of surface rock fragments and bare soil (up to 15 percent cover).

Dominant plant species

- black crowberry (*Empetrum nigrum*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- dwarf birch (*Betula nana*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- Bigelow's sedge (*Carex bigelowii*), grass
- (*Flavocetraria cucullata*), other herbaceous
- greygreen reindeer lichen (*Cladina rangiferina*), other herbaceous
- reindeer lichen (*Cladina mitis*), other herbaceous
- reindeer lichen (*Cladina stygia*), other herbaceous
- star reindeer lichen (*Cladina stellaris*), other herbaceous

Pathway 2.1a

Community 2.1 to 2.2

Cryoturbation leads to formation of non-sorted circles. The circles are raised mounds that have comparatively drier soils than the surrounding vegetation. Nonsorted circles has greater amounts of lichen cover.

Transition T1A

State 1 to 2

Cryoturbation results in the formation of non-sorted circles. These patterned ground features are pronounced enough to have a distinct a mosaic of vegetation.

Additional community tables

Animal community

Mammals common to MLRA 243 include brown bear, caribou, moose, musk ox, black bear, wolf, red fox, and rodents. Many species of migratory waterfowl and shore birds nest in the abundant ponds and wetlands. Raptors include gyrfalcon, peregrine falcon, golden eagle, hawks, and owls. Arctic char and Arctic grayling are in most of the rivers. Lake trout and northern pike are common in many lakes.

Hydrological functions

not available

Recreational uses

This remote area of Alaska is mostly undeveloped wildland and is sparsely populated. The area provides excellent opportunities for hunting and other kinds of wildland recreation. Most visitors are served by air taxi, guiding, and outfitting companies operating out of the major Alaska communities. Most of the communities are along the major rivers or lakes or on the coast. Kobuk Valley National Park is located within the Western Brooks Range MLRA. Visitors to Kobuk Valley NP typically fly in and camp / backpack in the park (USDA Agriculture Handbook 296).

Local residents use this area primarily for subsistence hunting, fishing, and gathering. In the Noatak Valley, many families leave their homes in villages in the spring and spend the summers at subsistence camps gathering salmon, caribou, and various wild greens and berries on the tundra.

Wood products

not available

Other products

not available

Other information

not available

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

Matthew Mayer

Blaine Spellman

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) | Matthew J Mayer Blaine T Spellman |
| Contact for lead author | matthew.mayer@usda.gov |
| Date | 09/26/2024 |
| 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:**
-