# Ecological site R245XY403AK
# Arctic scrub gravelly slopes

Last updated: 5/28/2025
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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): 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 – 6716890 – Alaska Arctic Non-Acidic Dryas Dwarf-Shrubland Viereck Communities: Dryas Dwarf Shrub Tundra – II.D.1.a (Viereck et al. 1994)

## Ecological site concept

• Arctic climate • Associated landforms are backslopes and summits of hills • Soils are derived from organic material, silty eolian deposits, and gravelly colluvium. • Soils are somewhat well drained, there is no flooding or ponding at this site. • Permafrost is not present. • The reference plant community is characterized as a Dryas Dwarf Shrub Tundra (Viereck et al 1994) with the dominant plants being eightpetal mountain avens, purple saxifrage, and arctic lupine.

## Associated sites

| | |
|---|---|
| **R245XY201AK** | **Arctic tussock gravelly frozen slopes**<br><br>Ecological site 201 occurs on similar slopes and aspects as site 403, but further downslope. Ecological site 201 is dominated by tussock forming grasses, and ponds frequently. Site 402 is a shrubland, and does not pond. |

## Similar sites

| | |
|---|---|
| **R245XY402AK** | **Arctic scrub gravelly frozen slopes**<br><br>Ecological site 402 is a shrub-birch ericaceous shrubland, while site 403 is a dryas dwarf-shrubland. Both are dominated by shrubs as opposed to tussock forming grasses, but their dominant species are different. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Dryas octopetala*<br>(2) *Saxifraga oppositifolia* |
| Herbaceous | (1) *Lupinus arcticus*<br>(2) *Carex scirpoidea* |

## Physiographic features

This Arctic scrub gravelly slopes (R245Y403AK) typically occurs on glaciated hills and plains. Elevation ranges from 20 feet up to 4750 feet. Associated slopes range from gently sloping to moderately steep. This site occurs on all aspects and shows no preference for north-facing or south-facing slopes. Neither flooding nor ponding occur at this site. There is no water table associated with this site.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Plains > Hill |
| Runoff class | Medium |
| Flooding frequency | None |

| | |
|---|---|
| Ponding frequency | None |
| Elevation | 80 – 270 m |
| Slope | 0 – 20 % |
| 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 | 10 – 1,450 m |
| Slope | 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 7 and 19 inches . 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) | 20-40 days |
| Freeze-free period (characteristic range) | 40-80 days |
| Precipitation total (characteristic range) | 310-330 mm |
| Frost-free period (actual range) | 0-70 days |
| Freeze-free period (actual range) | 20-100 days |
| Precipitation total (actual range) | 180-480 mm |
| Frost-free period (average) | 30 days |

| | |
|---|---|
| Freeze-free period (average) | 60 days |
| Precipitation total (average) | 310 mm |

### Influencing water features

Due to its landscape position, this site is neither associated with or influenced by streams or wetlands. Precipitation and throughflow are the main source of water for this ecological site. Surface runoff and throughflow contribute some water to downslope ecological sites.

### Soil features

• Soils formed in eolian deposits and gravelly colluvium.
• Rock fragments are common on the soil surface and comprise 15 percent cover
• The surface mineral horizon is a mucky silt loam formed from loess or silty colluvium that lacks rock fragments. This silty soil horizon is thin.
• Soils are very deep. While permafrost does not occur in the soil profile, strongly contrasting textural stratification is a restriction that occurs at very shallow depth.
• Permafrost is not present.
• The pH of the soil profile ranges from strongly acidic to slightly acidic.
• These are dry soils that are considered well drained.

**Table 5. Representative soil features**

| | |
|---|---|
| Parent material | (1) Colluvium<br>(2) Eolian deposits |
| Surface texture | (1) Gravelly silt loam |
| Family particle size | (1) Loamy-skeletal |
| Drainage class | Well drained |
| Permeability class | Moderately rapid |
| Depth to restrictive layer | 10 – 20 cm |
| Soil depth | 150 cm |
| Surface fragment cover <=3" | Not specified |
| Surface fragment cover >3" | 0 – 30 % |
| Available water capacity (0-101.6cm) | 6.35 – 7.62 cm |

| | |
|---|---|
| Clay content<br>(0-50.8cm) | 10 % |
| Sodium adsorption ratio<br>(0-25.4cm) | Not specified |
| Subsurface fragment volume <=3"<br>(0-152.4cm) | 20 – 40 % |
| Subsurface fragment volume >3"<br>(0-152.4cm) | 0 – 20 % |

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

| | |
|---|---|
| Drainage class | Not specified |
| Permeability class | Not specified |
| Depth to restrictive layer | Not specified |
| Soil depth | Not specified |
| Surface fragment cover <=3" | Not specified |
| Surface fragment cover >3" | Not specified |
| Available water capacity<br>(0-101.6cm) | Not specified |
| Clay content<br>(0-50.8cm) | Not specified |
| Sodium adsorption ratio<br>(0-25.4cm) | Not specified |

| | |
|---|---|
| Subsurface fragment volume <=3" (0-152.4cm) | 20 – 40 % |
| Subsurface fragment volume >3" (0-152.4cm) | 0 – 20 % |

## Ecological dynamics

The Arctic Foothills MLRA has a harsh climate and cold soils and occurs in the zone of continuous permafrost. This MLRA occurs in the arctic biome and has a growing season that is both short and cold. As a result, the vertical and horizontal structure of vegetation is severely limited. Vegetation within the arctic biome is typically restricted to dwarf shrubs, mosses, and lichens.

This ecological site (R245Y403AK) can be described as a dryas dwarf shrub tundra. Dryas tundra is common on windswept alpine sites throughout the northern two-thirds of Alaska. Soils are thin, well drained, and stony. Most of these communities are quite stable. Soils change very slowly in these exposed settings, which creates a relatively constant environment for plant growth (Viereck et al. 1994).

Dryas octopetala (Mountain Avens) is the dominant subshrub on this site. Mountain Avens is a circumpolar species found in the arctic tundra of Eurasia and North America. Mountain Avens is one of the first plants to establish itself in recently deglaciated landscapes, helping to stabilize soil and initiate ecological processes. Dryas octopetala is rarely found in fire prone landscapes.

Lupinus arcticus (Arctic lupine) is a dominant herbaceous species on this site. Arctic lupine is a perennial legume common on recently disturbed or exposed landscapes. Arctic lupine fixes nitrogen in otherwise nutrient poor soils. Like Mountain Avens, Arctic lupine is not adapted to fire prone environments but could likely survive through its rhizome system and potentially benefit from reduced competition in a post fire environment.

## State and transition model

## Additional community tables

**Table 7. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

## 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 operating 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 Arctic National Wildlife Reserve, and the Noatak National Preserve are all partially located in MLRA 245. Gates of the Arctic National Park 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

Matthew J Mayer
Blaine T Spellman

## Approval

Blaine Spellman, 5/28/2025

## 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 | 09/25/2026 |
| Approved by | |
| 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):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    **Dominant:**

    **Sub-dominant:**

    **Other:**

    **Additional:**

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth ( in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**

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