

# Ecological site YX244X00A111

## Arctic Mountain Hummocks

Last updated: 5/28/2025

Accessed: 03/22/2026

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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): 244X–Northern Brooks Range Mountains

Major Land Resource Area (MLRA) 244X includes the steep, rugged, high mountains and narrow valleys on the northern side of the Brooks Range. This remote wildland is sparsely populated and is approximately 14,525 square miles (37,615 square kilometers). The transition to the Arctic climate is the break into MLRA 244X from the surrounding subarctic MLRAs. Elevation ranges from about 1,969 feet (600 meters) to 8,570 feet (2,613 meters) at the summit of Mount Igikpak. The major rivers are the Kongakut, Aichilik, Jago, Canning, Ivishak, Ribdon, Atigun, Anaktuvuk, and Killik Rivers. They drain to the Colville River and Arctic Ocean.

Except for the highest peaks, the steep upper ridges, and some unglaciated valleys, glacial ice during the Early and Middle Pleistocene covered the MLRA. By the Late Pleistocene, only the highest valleys and mountains remained glaciated. Periglacial features (gelifluction lobes, polygons, and stripes) and fluvial deposits are common on terraces and gentle slopes. Glacial deposits overlay stratified sedimentary bedrock. This area is in the zone of continuous permafrost. Inclusions of volcanic and igneous rocks occur in the eastern part of the MLRA.

The Brooks Range is characterized by continental arctic climate. The average annual precipitation ranges from 7 to 40 inches (180 to 1,015 millimeters) with an average annual snowfall of 50 to 100 inches (125 to 255 centimeters). The average annual temperature ranges from 8 to 16 degrees Fahrenheit (-13 to -9 degrees C), with freezing temperatures possible any month of the year. Summer temperatures reach 90 to 100 degrees Fahrenheit (32 to 38 degrees Celsius), and winter temperatures drop as low as -75 degrees Fahrenheit (-60 degrees Celsius). The position of this MLRA above the Arctic

Circle lends to several days of 24-hour sunlight in June and several sunless days in December.

Freshwater is very limited due to frozen or low flow through long winters. Most domestic use water is from private wells. Aquifers are highly susceptible to contamination from surface activities (septic systems, landfills, and leaking fuel storage tanks).

The dominant soil order in this MLRA is Gelisols. The main soils are Aquiturbels, Histoturbels, Molliturbels, and Haploturbels. These are shallow or moderately deep to permafrost, poorly- to very poorly- drained, and formed in colluvium, slope alluvium, and residuum. Fibristels are shallow or moderately deep to permafrost, very poorly drained, and formed in thick deposits of organic material; in depressions, drainageways, and basins. Miscellaneous areas make up about 75 percent of this MLRA primarily composed of rubble, chutes, rock outcrops, and small glaciers. Lakes make up less than two percent of the area

Low willow, ericaceous shrub scrub, and tussocks are most dominant at lower elevations, with wet sites supporting wet meadows and willow scrub. Dwarf scrub communities (black crowberry, ericaceous shrubs, Dryas, and dwarf willow) are prominent on mountain slopes and ridges with exposed areas dominated by lichens, forbs, sedges, and mosses. As elevation and exposure increase, vegetation disappears and is replaced by rubble, talus, and other miscellaneous areas. This elevational transition is highly variable but roughly occurs at 6,500 feet (Zou et al. 2023) where glaciers also commonly prevail.

Villages use this remote area primarily for subsistence. Mining and prospecting of mineral resources historically occurred. Current disturbance relates to the pipeline and construction of Dalton highway. This disturbance of the fragile permafrost-affected soils is of increasing concern.

## **LRU notes**

No LRUs are developed for this Major Land Resource Area (MLRA). Soils that are within this area are maintained as arctic. Soils corresponding to boreal communities are correlated to the appropriate adjacent MLRA.

## **Classification relationships**

The Brooks Range is the most northerly extension of the Rocky Mountains occurring within the Arctic Mountains province of the Rocky Mountain System.

Description of the Ecoregions of the United States (Bailey 1983)

100 Polar Domain

120 Tundra Division

M120 Tundra Division - Mountain Provinces

M121 Brooks Range Tundra--Polar Desert Province

United States National Vegetation Classification  
 C04. Polar & High Montane Scrub, Grassland & Barrens Class  
 S12. Temperate to Polar Alpine & Tundra Vegetation Subclass  
 F031. Polar Tundra & Barrens Formation  
 D044. Arctic Tundra & Barrens Division  
 M173. Feltleaf Willow - Eight-petal Mountain-avens - Tussock Cottongrass  
 Tundra Macrogroup  
 G896. Arctic Dwarf-shrub Tundra Group  
 A4336. Arctic Nonacidic Dwarf Willow Tundra Alliance

LandFire BpS Model/Description Version: Nov. 2024

- 16970 North American Arctic Freshwater Marsh Model
- 17060 North American Arctic Wet Sedge Tundra and Polygonal Ground
- 16822 North American Arctic Scrub Birch-Ericaceous Shrubland - Infrequent Fire

## Ecological site concept

- This arctic ecological site occurs on the summits and footslopes of rounded mountains. These mountains are not associated with limestone geology. Turf hummocks are common periglacial features.
- Soils formed in silty and gravelly colluvium. These mineral soils are commonly capped with nine inches of peat.
- While soils are very deep, permafrost occurs at shallow to moderate depth.
- Soils pond frequently. These very poorly drained soils have a very shallow water table throughout the growing season. Seasonal runoff, snow melt, and precipitation will cause shifts in pond depth throughout the year.
- Dominant cover is predominantly herbaceous species such as sedges, rushes, and grasses like water sedge, tall cottongrass, and pendantgrass. As one moves away from the standing water, the community will shift towards dominance of tussocks (*Eriophorum vaginatum*) and shrubs like dwarf birch and bog blueberry.

## Associated sites

YX244X00A102	<p><b>Calcareous, Wet Arctic Mountain Slopes</b>          Calcareous Wet Arctic Mountain Slopes ecological site will occur in close proximity to and in combination with ponded areas. The density of vegetation, and species dominance shifts to more wetland driven species on the ponded areas.</p>
YX244X00A112	<p><b>Arctic Shallow Tundra Mountain Slopes</b>          Arctic Tussock Tundra Mountain Slopes ecological site will occur in close proximity to and in combination with ponded areas. The density of vegetation, and species dominance shifts to more wetland driven species on the ponded areas.</p>

## Similar sites

YX244X00A202	<p><b>Arctic Mountain Valley Floodplains</b></p> <p>Vegetation is similar between ponded sites and the riparian floodplains. Floodplains tend to support more robust and taller vegetation whereas ponded sites are grass herbaceous dominated.</p>
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Eriophorum angustifolium</i> (2) <i>Carex aquatilis</i>

## Legacy ID

R244XY111AK

## Physiographic features

- Occurs on the summits and footslopes of rounded mountains. Turf hummocks are common periglacial features that are typically 4 to 20 inches in height and 8 to 35 inches in diameter with or without a core of mineral soil (Schoeneberger and Wysocki 2017).
- Elevation typically ranges from about 1,975 feet along the edge of the Arctic Foothills to 6,500 feet which provisionally marks the upper threshold of vegetation in this area.
- Ponding occurs frequently for long durations of time. Ponding is normally two to eight inches in depth but has potential to be deeper. Flooding does not occur.
- A very shallow water table occurs throughout the growing season.
- Slopes typically range from two to nine percent but may range to 16 percent.
- Associated with low to medium amounts of runoff to adjacent, downslope ecological sites.

**Table 2. Representative physiographic features**

Slope shape across	(1) Linear
Slope shape up-down	(1) Linear
Hillslope profile	(1) Summit (2) Footslope
Landforms	(1) Mountain range > Mountain (2) Mountain range > Mountain > Turf hummock
Runoff class	Low to medium
Flooding frequency	None

Ponding duration	Very long (more than 30 days)
Ponding frequency	Frequent
Elevation	602–1,981 m
Slope	2–9%
Ponding depth	5–20 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 frequency	Not specified
Ponding duration	Not specified
Ponding frequency	Not specified
Elevation	602–2,612 m
Slope	2–16%
Ponding depth	Not specified
Water table depth	Not specified

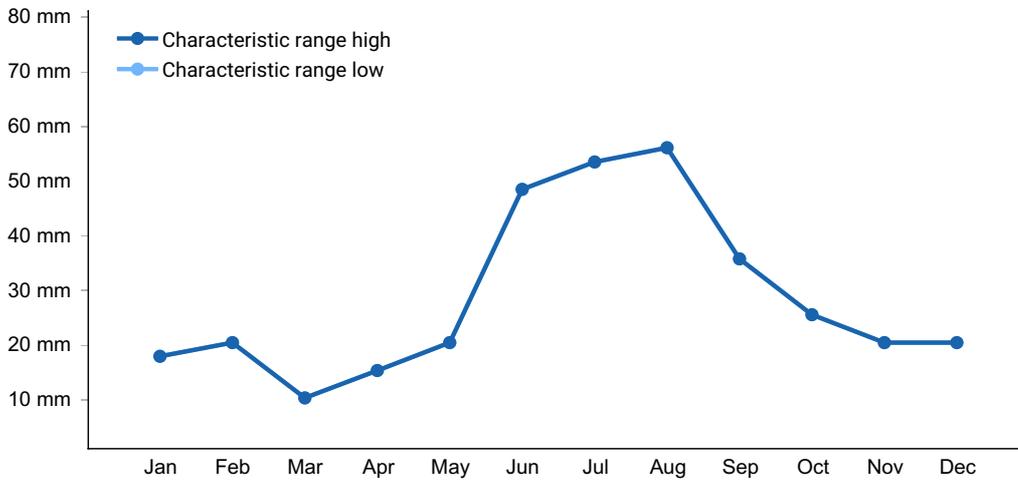
## Climatic features

Brief, cool summers and long, very cold winters characterize the continental arctic climate. The average annual precipitation throughout most of this area ranges from 15 to 40 inches (380 to 1,015 millimeters). The average annual snowfall is about 50 to 100 inches (125 to 255 centimeters). The average annual temperature ranges from about 8 to 16 degrees F (-13 to -9 degrees C). Freezing temperatures can occur in any month of the year. The Chandalar Shelf DOT climate station is the only station near this MLRA (Major Land Resource Area) and has incomplete data. The station is on the border of the MLRA and is not representative of the climate within MLRA 244X.

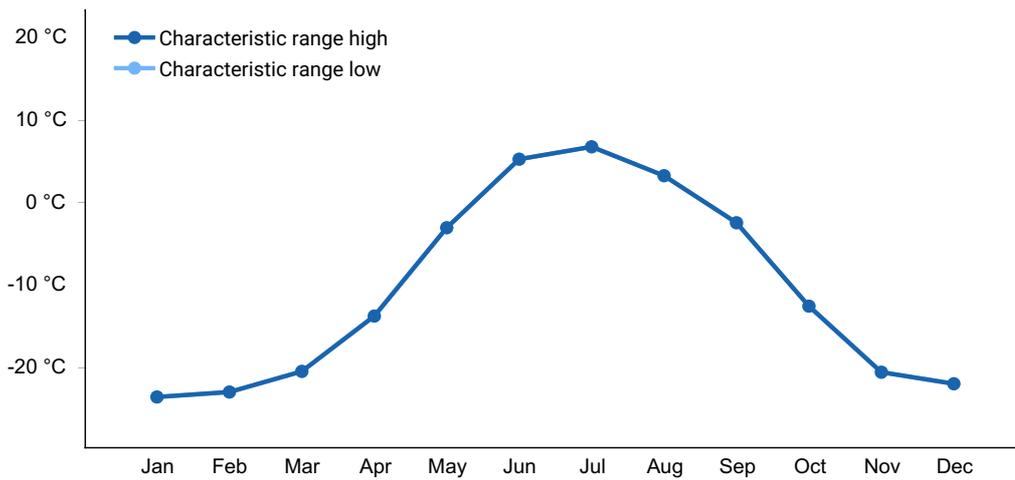
**Table 4. Representative climatic features**

Frost-free period (characteristic range)	20-60 days
Freeze-free period (characteristic range)	5-45 days
Precipitation total (characteristic range)	381-864 mm
Frost-free period (actual range)	
Freeze-free period (actual range)	
Precipitation total (actual range)	178-1,016 mm

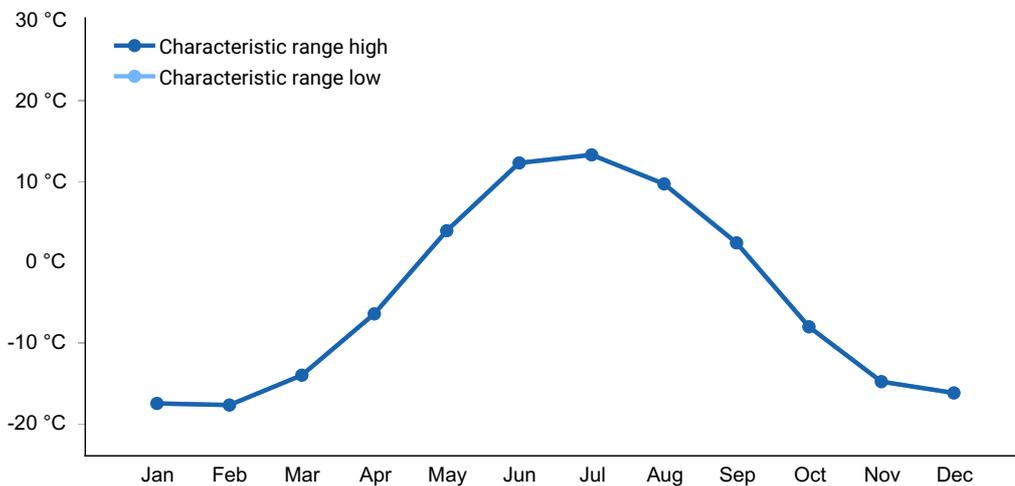
Frost-free period (average)	40 days
Freeze-free period (average)	
Precipitation total (average)	



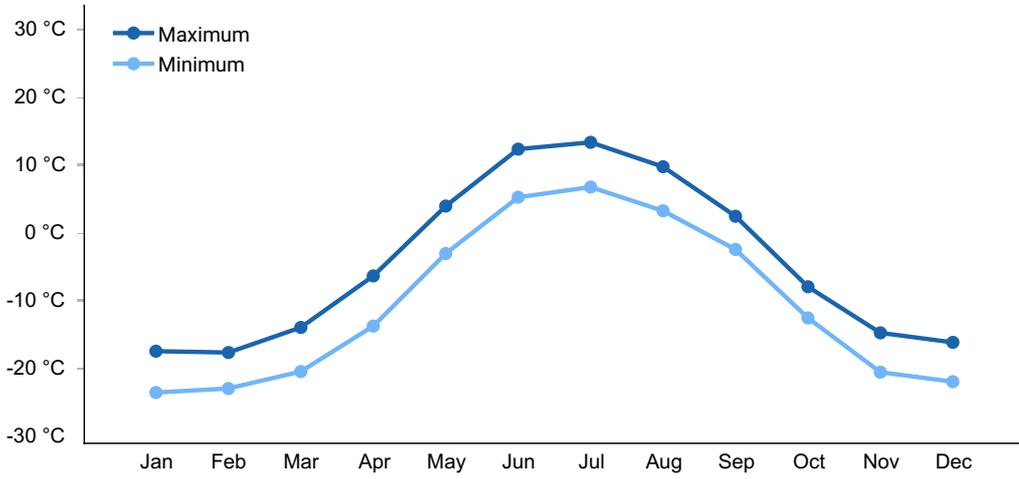
**Figure 1. Monthly precipitation range**



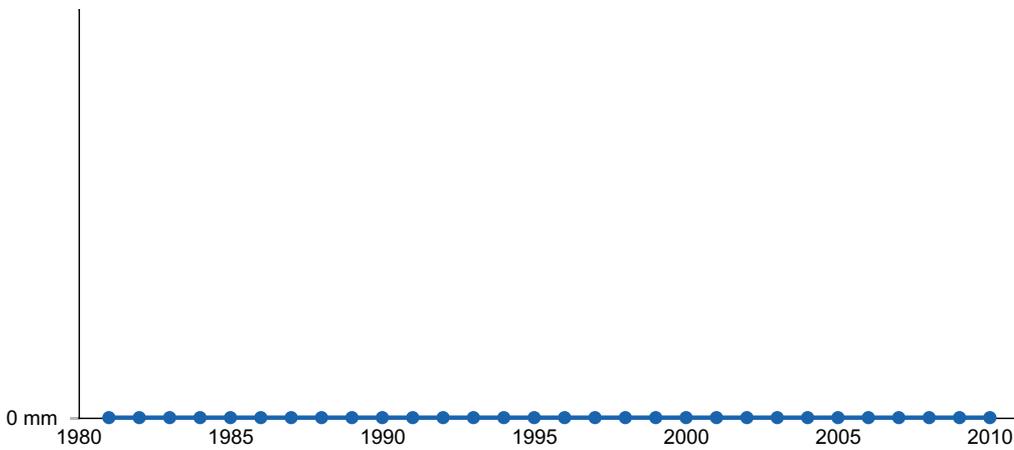
**Figure 2. Monthly minimum temperature range**



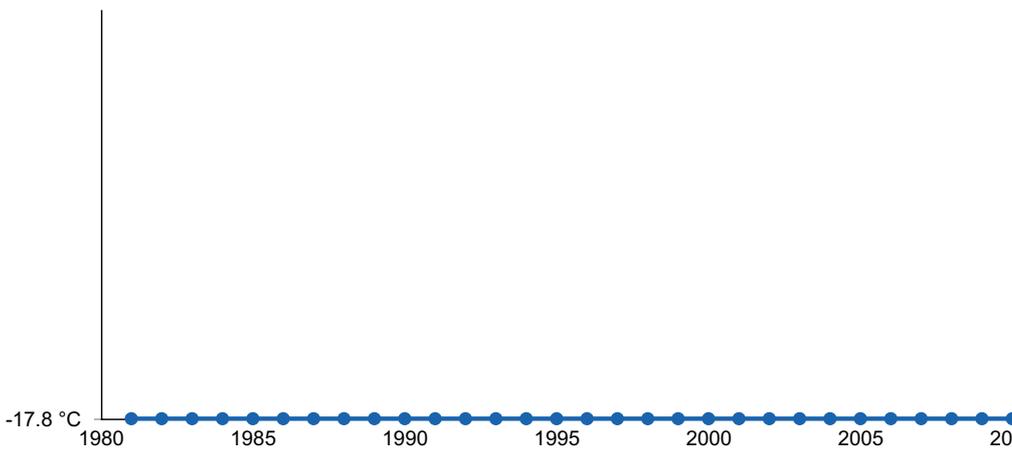
**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) CHANDALAR SHELF DOT [USC00501497], Southerly North Slope Bo, AK

## Influencing water features

Precipitation and ground water 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

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

## Soil features

- Soils formed in organic material over silty and gravelly colluvium.
- Rock fragment do not occur on the soil surface.
- The mucky silt loam surface horizon is capped with up to nine inches of peat.
- Subsurface rock fragments range from 20 to 35 percent of the soil profile by volume, with gravels more abundant than cobbles.
- While soils are very deep, permafrost occurs at shallow to moderate depth (15 to 25 inches) and strongly contrasting textural stratification occurs at shallow depths (13 to 18 inches).
- The pH of the soil profile ranges from very strongly acidic to neutral

This ecological site is correlated to the component Arctic tussock-gravelly frozen colluvial slopes. Soils are classified as Gelisols in the great group Histoturbels.

This Major Land Resource Area (MLRA) is remote and difficult to reach and has not had soil verification completed. The information was obtained using the STATSGO soils information, a class 5 soils product. When opportunity presents to collect data in this MLRA, this Provisional Ecological Site will be updated.

**Table 5. Representative soil features**

Parent material	(1) Organic material (2) Colluvium
Surface texture	(1) Peat (2) Mucky silt loam
Family particle size	(1) Loamy-skeletal
Drainage class	Very poorly drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	33–64 cm
Soil depth	152 cm
Surface fragment cover <=3"	0%

Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	9.65–18.03 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5–6
Subsurface fragment volume <=3" (0-101.6cm)	15–25%
Subsurface fragment volume >3" (0-101.6cm)	5–10%

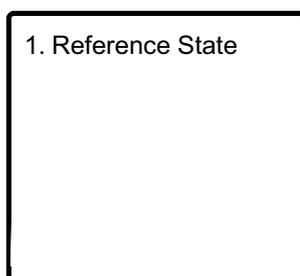
## Ecological dynamics

Pendantgrass (*Arctophila fulva*), water sedge (*Carex aquatilis*), and tall cottongrass (*Eriophorum angustifolium*) are dominant graminoids. As one moves away from the ponded water, the vegetation transforms into a tussock-driven site. Ericaceous shrubs, dwarf birch, and low willows are associated with the drier edges of the ponded water.

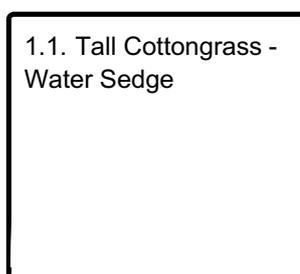
Fire history and documentation is sparse for the wet areas within the high arctic. However, vegetative cover is present so when dry conditions persist there is fine fuels that, when conditions are ideal, may burn. However, no supportive information is available pertaining to fire dynamics of this ecological site. The nature of ponded water and wetlands provides a natural shifting edge community providing a high successional turn over. However, some stages are thought to be long persisting (500 years or longer). Further research and information are pending on the successional communities and disturbance regimes of these ponded communities.

## State and transition model

### Ecosystem states



### State 1 submodel, plant communities



## State 1

### Reference State

Disturbance across much of the Brooks Range arctic tundra is difficult to access. This area receives minimal human influence. The natural disturbance regime is at risk with changes in weather patterns and increasing recreational activity in all of Alaskan backcountry areas. However, the available data is understood to be of the reference state of this ecological site. This ecological site supports one community in the reference state. This state is characterized by shallow ponded water (two to eight inches in depth), supporting submerged and floating aquatic vegetation as well as emergent herbaceous species. As one moves distal from the edge of the ponded water, the plant community transitions into a mosaic of tussock tundra and ericaceous shrub and lichen tundra. The presence of permafrost mutes the definition of the transition line, making it difficult to delineate a true break between plant communities. The lack of specific site data for this Major Land Resource Area (MLRA) prevents a clear definition in this transition, so only one modal community will be identified.

### Dominant plant species

- dwarf birch (*Betula nana*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- pendantgrass (*Arctophila fulva*), grass
- water sedge (*Carex aquatilis*), grass
- tall cottongrass (*Eriophorum angustifolium*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous
- common mare's-tail (*Hippuris vulgaris*), other herbaceous
- buckbean (*Menyanthes trifoliata*), other herbaceous

## Community 1.1

### Tall Cottongrass - Water Sedge

This community has greater than ten percent herbaceous cover and occurs throughout the arctic. In deeper depressions, small aquatic beds and a few submerged aquatic plants will persist in areas of open water. Species diversity is low within each zone of the hydrogeomorphic structure. However, over the extent of the pond, there are a variety of species. The major vegetative cover is grasses and sedges, the dominant grass species being pendantgrass (*Arctophila fulva*) and sedges being water sedge (*Carex aquatilis*) and tall cottongrass (*Eriophorum angustifolium*). Emergent species may occur, such as purple marshlocks (*Comarum palustre*), common mare's-tail (*Hippuris vulgaris*), Northwest Territory sedge (*Carex utriculata*), buckbean (*Menyanthes trifoliata*), tufted loosestrife (*Lysimachia thyrsoiflora*), and water horsetail (*Equisetum fluviatile*). Aquatic beds support submerged vegetation. The transition between soil and standing water supports mosses such as Sphagnum spp., polytrichum moss (*Polytrichum strictum*), splendid feather moss (*Hylocomium splendens*), and turgid aulacomnium moss (*Aulacomnium turgidum*).

Lichens are common, especially as one shifts further from the standing water.

## Dominant plant species

- bog blueberry (*Vaccinium uliginosum*), shrub
- pendantgrass (*Arctophila fulva*), grass
- water sedge (*Carex aquatilis*), grass
- tall cottongrass (*Eriophorum angustifolium*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous
- common mare's-tail (*Hippuris vulgaris*), other herbaceous
- buckbean (*Menyanthes trifoliata*), other herbaceous

## Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>sedges, grasses, hydrophytic</b>			–	–
	pendantgrass	ARFU2	<i>Arctophila fulva</i>	–	–
	water sedge	CAAQ	<i>Carex aquatilis</i>	–	–
	tall cottongrass	ERAN6	<i>Eriophorum angustifolium</i>	–	–
	Northwest Territory sedge	CAUT	<i>Carex utriculata</i>	–	–
	widleaf polargrass	ARLA2	<i>Arctagrostis latifolia</i>	–	–
	arctic bluegrass	POAR2	<i>Poa arctica</i>	–	–
	Bigelow's sedge	CABI5	<i>Carex bigelowii</i>	–	–
	tussock cottongrass	ERVA4	<i>Eriophorum vaginatum</i>	–	–
	white cottongrass	ERSC2	<i>Eriophorum scheuchzeri</i>	–	–
	red cottongrass	ERRU2	<i>Eriophorum russeolum</i>	–	–
	round sedge	CARO7	<i>Carex rotundata</i>	–	–
	looseflower alpine sedge	CARA5	<i>Carex rariflora</i>	–	–
	creeping sedge	CACH5	<i>Carex chordorrhiza</i>	–	–
	beaked sedge	CARO6	<i>Carex rostrata</i>	–	–
	rock sedge	CASA10	<i>Carex saxatilis</i>	–	–
	Fisher's tundra grass	DUFI	<i>Dupontia fisheri</i>	–	–

<b>Forb</b>					
2	<b>aquatic forbs</b>			–	
	water horsetail	EQFL	<i>Equisetum fluviatile</i>	–	–
	marsh fleabane	SECO2	<i>Senecio congestus</i>	–	–
	purple marshlocks	COPA28	<i>Comarum palustre</i>	–	–
	common mare's-tail	HIVU2	<i>Hippuris vulgaris</i>	–	–
	buckbean	METR3	<i>Menyanthes trifoliata</i>	–	–
	tufted loosestrife	LYTH2	<i>Lysimachia thyrsoiflora</i>	–	–
<b>Moss</b>					
3	<b>mosses</b>			–	
	drepanocladus moss	DREPA3	<i>Drepanocladus</i>	–	–
	sphagnum	SPHAG2	<i>Sphagnum</i>	–	–
	polytrichum moss	POST70	<i>Polytrichum strictum</i>	–	–
	splendid feather moss	HYSP70	<i>Hylocomium splendens</i>	–	–
	Schreber's big red stem moss	PLSC70	<i>Pleurozium schreberi</i>	–	–
<b>Lichen</b>					
4	<b>lichen</b>			–	
<b>Shrub/Vine</b>					
5	<b>ericaceous shrub</b>			–	
	dwarf birch	BENA	<i>Betula nana</i>	–	–
	bog blueberry	VAUL	<i>Vaccinium uliginosum</i>	–	–
	marsh Labrador tea	LEPAD	<i>Ledum palustre ssp. decumbens</i>	–	–
	tealeaf willow	SAPU15	<i>Salix pulchra</i>	–	–
	black crowberry	EMNI	<i>Empetrum nigrum</i>	–	–

## Animal community

The Brooks Range is an important big-game area in Alaska. Mammals common to the area include brown bear, black bear, wolf, caribou, and Dall sheep. The smaller mammals include marmot, red fox, Arctic fox, wolverine, ground squirrel, lemming, and pika. The Brooks Range is an important resting area for migrating waterfowl and songbirds during summer. Raptors prominent in many areas include golden eagles, marsh hawks, gyrfalcons, and snowy and other open country owls.

## **Hydrological functions**

Overland water seepage and subsurface water seepage from snowmelt and precipitation events supports hydrophytic vegetation on this ecological site. Otherwise, there is no active connection to ground water or channel hydraulics.

## **Recreational uses**

This remote area is used for sport hunting and other kinds of wildland recreation. Visitors use air taxi, guiding, and outfitting companies operating out of the major Alaska communities.

## **Wood products**

Wooded areas reside just outside of the Major Land Resource Area.

## **Other products**

This remote area is primarily used for subsistence hunting, fishing, and gathering.

## **Inventory data references**

No on-site data is available. Information used to build this ecological site was obtained from existing land cover and vegetation maps, literature review, and vegetative summaries from partnering agencies.

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## Contributors

Marji Patz  
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Phil Barber

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Nathan Roe, Ecological Site Specialist in California (Southwest Region) provided the R script and analysis process to summarize data within the NASIS database. Matthew Mayer, Ecological Site Specialist in Wasilla Alaska provided the R script to summarize geospatial data for climate information.

## Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	03/22/2026
Approved by	Blaine Spellman
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

# Indicators

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

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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):**
- 

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:**
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