USDA Natural Resources
Conservation Service

Ecological site R224XY201AK
Depressions and Seep Provisional Ecological Site Group

Last updated: 6/13/2025
Accessed: 01/22/2026

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): 224X–Cook Inlet Lowlands

Major Land Resource Area (MLRA) 224X consists of lowlands and lower mountain slopes of the Susitna and Matanuska Valleys, western Kenai Peninsula, and west side of Cook Inlet. It makes up about 10,965 square miles (28,400 square kilometers). The terrain is a broad expanse of braided flood plains, high gradient rivers, rolling plains, terraces and hills bordered by the surrounding mountains. This MLRA contains a large percentage of Alaska's total population and includes the most extensive road systems in the state. Major rivers include the Susitna, Yentna, Little Susitna, Matanuska, Kenai, and Deep Creek that all drain into Cook Inlet. Large lakes include Tustumena and Skilak.

Climate is highly variable ranging from temperate maritime to continental subarctic. Winter arctic weather systems are common in the northern portion of the MLRA. The average annual precipitation ranges from 15 to 60 inches (380 to 1,525 millimeters). The average annual snowfall is about 60 to 120 inches (150 to 305 centimeters). The average annual temperature is about 27 to 36 degrees F (-3 to 2 degrees C). The freeze-free period averages 65 to 160 days, decreasing with elevation.

Vegetation ranges from spruce/birch forests in the lowlands to subalpine scrubland at high elevations. Saltwater meadows along the coast and wetlands and extensive marsh occur throughout the lowlands across the valley. In most years precipitation is adequate for crops, with limited irrigation. Major rivers are affected by high sediment-laden glacial meltwater and ice dam damage and flooding is a risk during spring thaw. Water is hard or very hard, with high potential levels of iron, but is otherwise of excellent quality. Alpine vegetation is associated with the adjacent Cook Inlet Mountains MLRA (223X).

The dominant soil orders in this MLRA are Spodosols, Histosols, Entisols, and Inceptisols. Water, riverwash, beaches, and other miscellaneous (non-soil) areas are 15 percent of this MLRA. Glacial and volcanic ash wind-blown deposits influence much of area, while fluvial deposits are common in riparian areas.

The MLRA is visited by a great number of migrating birds and supports large populations of waterfowl. Most of the rivers and streams are important spawning grounds for salmon (Chinook, coho, and red salmon). Peonies, hay, potatoes, and hardy vegetables are important agriculture with a few dairy and beef cattle farms present. Commercial logging and subsistence firewood gathering are locally important, as is subsistence gathering. Other major industries in the area include commercial fishing, fish processing, and oil and gas extraction. Tourism and wildland recreation are becoming increasingly important.

The major resource concerns are water erosion and water quality. Aquifers are highly susceptible to contamination from runoff. The intrusion of seawater can be a problem along Cook Inlet. Rapid development and off-road recreation are creating significant damage to the wildlands.

LRU notes

This MLRA is a transitional zone between temperate maritime and continental subarctic climatic zones. Arctic winter weather patterns are present in northern areas. With this transition, there are major variations in climatic influences and vegetative responses. With further soil survey and vegetative surveys, this MLRA will be evaluated for potential Land Resource Unit (LRU) development.

Classification relationships

Coastal Trough Province of the Pacific Mountain System

USFS Description of Ecoregions of the United States
100 Polar Domain
130 Subarctic Division
M135 Alaska Range Humid Tayga--Meadow Province

United States National Vegetation Classification
C01. Forest & Woodland Class
S15. Temperate & Boreal Forest & Woodland Subclass
F001. Boreal Forest & Woodland Formation
D014. North American Boreal Forest and Woodland Division
M156. White Spruce - Black Spruce Boreal Montane Woodland Group

LandFire BpS Model/Description Version: Nov. 2024
- 16180 Western North American Boreal Shrub-Sedge Rich and Alkaline Fen
- 16200 Western North American Boreal Shrub-Sedge Bog and Acidic Fen

- 16210 Western North American Boreal Black Spruce Bog and Dwarf-Tree Peatland
- 16240 Western North American Boreal Shrub Swamp
(Landfire, 2024)

Ecological site concept

- This ecological site occurs in depressions, and include bogs, fens, muskeg and muskeg borders.
- Poorly to very poorly drained soils
- Moderately to very deep soils
- Organic soils with fibrous peat materials
- Formed in depressions on upland and freshwater lowlands
- Water table present and ponding occurs for some part of the growing season.
- Not directly associated with a stream or river channel.

Associated sites

F224XY204AK	**Mixed Forest/Meadow Flood Plains Provisional Ecological Site Group** These ecological sites are hydrologically linked on the same mountain and river valleys.

Similar sites

R224XY202AK	**Drainage Complex Provisional Ecological Site Group** Depressions are associated with still or stagnant water and have a higher degree of peat and organic build up.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix barclayi* (2) *Betula nana*
Herbaceous	(1) *Carex* (2) *Juncus*

Physiographic features

This ecological site occurs in depressions, and include bogs, fens, muskeg and muskeg borders. Elevation ranges from 50 to 1800 feet above sea level. It is on all aspects. Slopes are nearly level to strongly sloped (zero to five percent). Water ponds for long durations of time and can be ten or more inches deep. A water table or subsurface seep is present. Flooding may be occasional and brief, but ponding is the major driver of wetland vegetation on this ecological site.

Table 2. Representative physiographic features

Landforms	(1) Plains > Depression (2) Hills > Depression (3) Till plain > Depression (4) Outwash plain > Depression
Runoff class	Medium
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Occasional to frequent
Elevation	15–549 m
Slope	0–5%
Ponding depth	0–25 cm
Water table depth	0–10 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding duration	Not specified
Flooding frequency	Not specified
Ponding duration	Very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	0–610 m
Slope	0–8%
Ponding depth	0–30 cm
Water table depth	Not specified

Climatic features

Climate is highly variable, generally ranging from temperate maritime to continental subarctic. Most weather systems originate in the North Pacific and the Gulf of Alaska. In winter, particularly in the northern part of the area, arctic weather systems are more common. In the Matanuska Valley, seasonal winds pick up fine-earth material from unvegetated flood plains and create extensive dust clouds that can reach an altitude of 5,000 feet (1,525 meters) or more. The average annual precipitation ranges from 15 to 60 inches (380 to 1,525 millimeters). It generally is higher on the southern Kenai Peninsula, in the northern Susitna Valley, and at the higher elevations along the mountains. The

average annual snowfall is about 60 to 120 inches (150 to 305 centimeters). The average annual temperature is about 27 to 36 degrees F (-3 to 2 degrees C). The freeze-free period averages 65 to 160 days, decreasing in length with elevation. (USDA-NRCS 2022).

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/. Point Mackenzie, Anchorage INTL AP, Talkeetna AP, Homer AP, and Kenai Muni AP are the representative climate stations. The following graphs and charts are a collective sample representing the averaged normals and 30-year annual rainfall data for the selected weather stations from 1981 to 2010.

Table 4. Representative climatic features

Frost-free period (characteristic range)	84-115 days
Freeze-free period (characteristic range)	118-142 days
Precipitation total (characteristic range)	457-635 mm
Frost-free period (actual range)	81-117 days
Freeze-free period (actual range)	112-144 days
Precipitation total (actual range)	432-686 mm
Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	533 mm

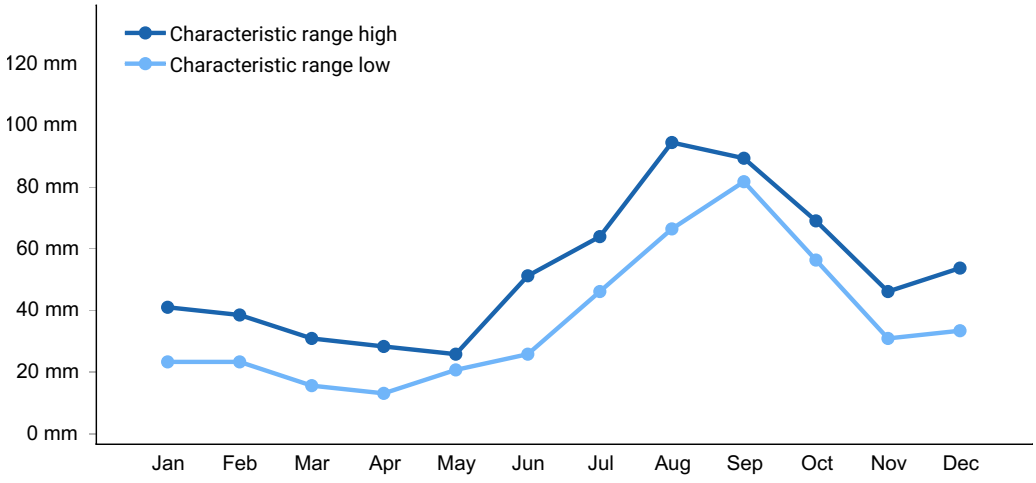

Figure 1. Monthly precipitation range

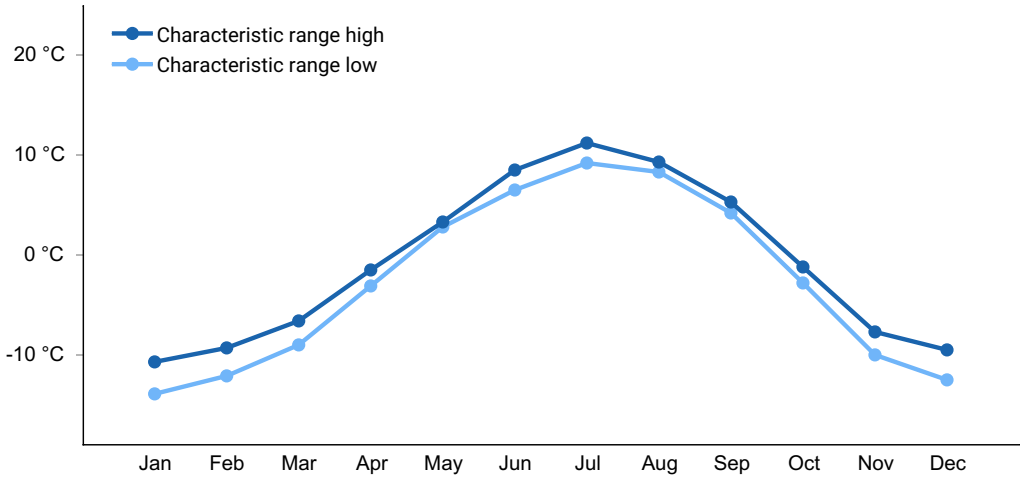

Figure 2. Monthly minimum temperature range

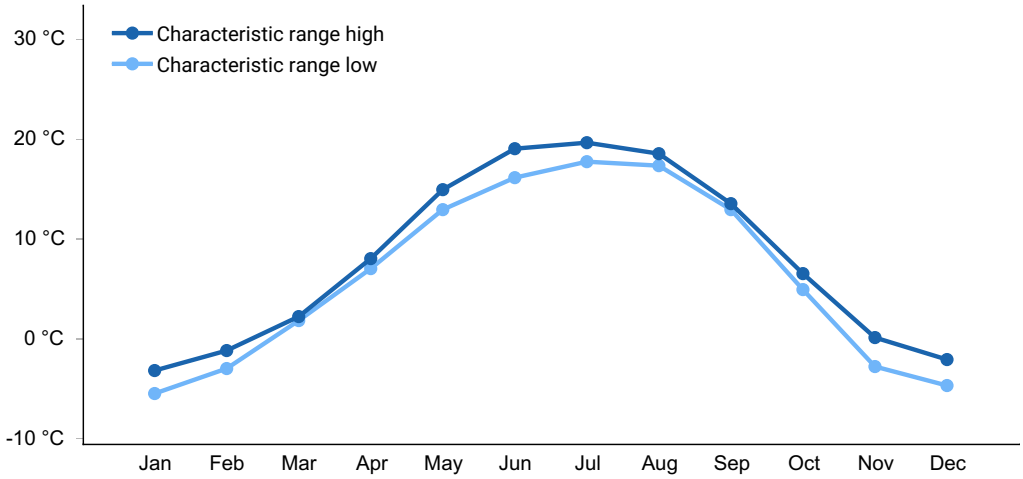

Figure 3. Monthly maximum temperature range

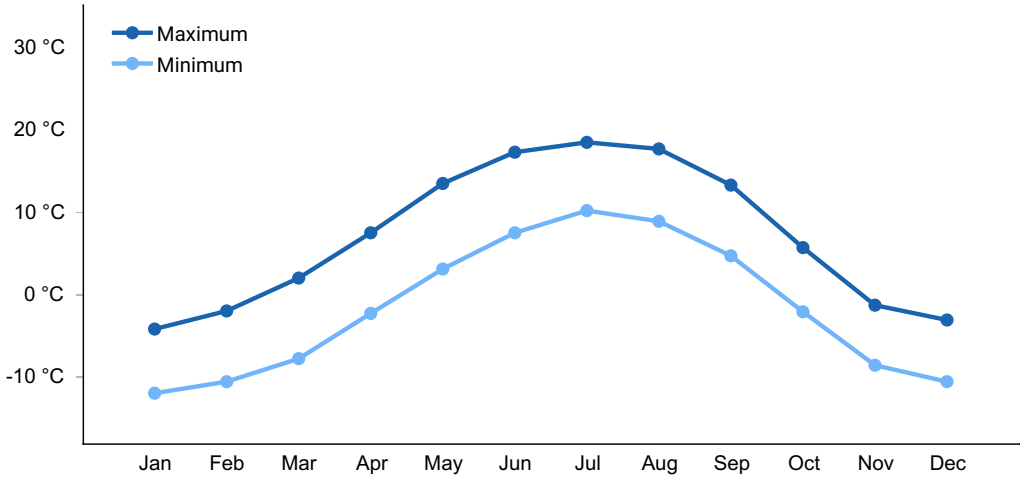

Figure 4. Monthly average minimum and maximum temperature

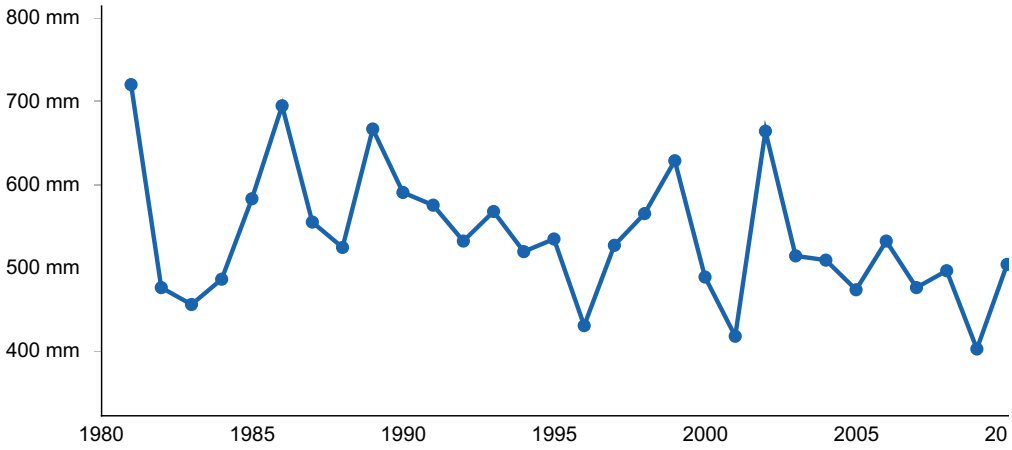

Figure 5. Annual precipitation pattern

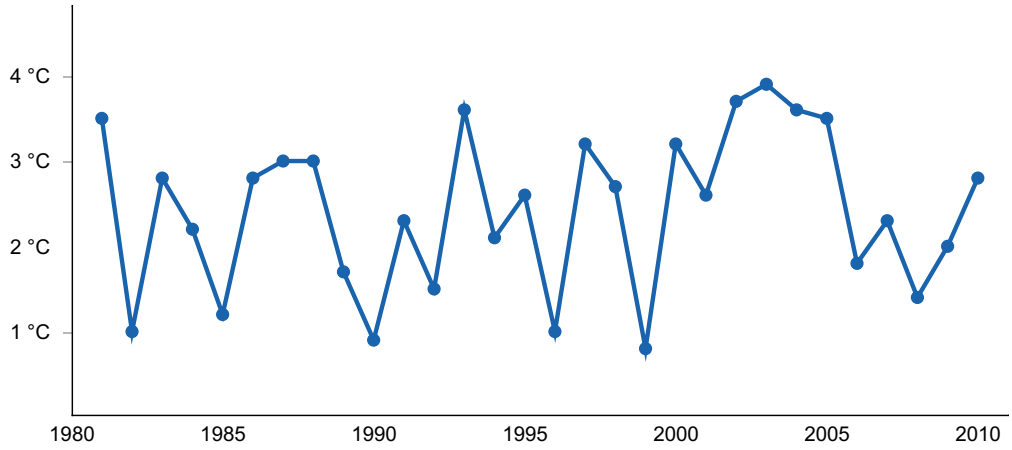

Figure 6. Annual average temperature pattern

Climate stations used

- (1) TALKEETNA AP [USW00026528], Talkeetna, AK
- (2) POINT MACKENZIE [USC00507444], Wasilla, AK
- (3) ANCHORAGE INTL AP [USW00026451], Anchorage, AK
- (4) KENAI MUNI AP [USW00026523], Kenai, AK
- (5) HOMER AP [USW00025507], Homer, AK

Influencing water features

Soils and vegetation are influenced by a water table and ponding. Flooding is occasional when present. Non-flooding overland flow from upland runoff is a contributing factor. This ecological site may occur near stream systems.

Wetland description

Wetland classification would apply to this system. However, due to the range of variables, no single classification is provided at this time.

Soil features

This ecological site is associated with poorly to very poorly drained soils. They are very deep, organic soils formed in a variety of parent materials, such as glacial drift, till, and glaciofluvial deposits. The organic cap depth varies but can exceed 60 inches in places where peat has substantially accumulated.

Table 5. Representative soil features

Parent material	(1) Organic material (2) Alluvium (3) Ash flow (4) Loess (5) Cryoturbate (6) Till
Surface texture	(1) Peat (2) Gravelly silt loam (3) Muck (4) MuckGravelly, very cobbly silt loam
Drainage class	Poorly drained to very poorly drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	Not specified
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	22.61–32 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5–7.3
Subsurface fragment volume <=3" (0-152.4cm)	0–1%
Subsurface fragment volume >3" (0-152.4cm)	0%

Table 6. Representative soil features (actual values)

Drainage class	Somewhat poorly drained to very poorly drained
Permeability class	Not specified
Depth to restrictive layer	76–152 cm
Soil depth	Not specified
Surface fragment cover <=3"	Not specified

Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	1.27–47.24 cm
Soil reaction (1:1 water) (0-25.4cm)	Not specified
Subsurface fragment volume <=3" (0-152.4cm)	0–30%
Subsurface fragment volume >3" (0-152.4cm)	0–19%

Ecological dynamics

This ecological site group includes a muskeg bog of sedges (Carex spp.), grasses, dwarf birch (*Betula nana*), bog blueberry (*Vaccinium uliginosum*), and willow (Salix spp.) with occasional stands of black spruce (*Picea mariana*). Sphagnum moss frequently occurs as a dense ground cover. The historical plant community will produce approximately 700 to 1000 pounds per acre of air-dry forage or herbage. The deepest parts of these depressions may support open water.

Community composition varies between locations and over years. Fluctuations in species cover and relative production may change from year-to-year, dependent upon shifts in precipitation or other climatic factors.

Removal of vegetation cover on bog areas will tend to create shallow lakes and marshes. This ecological site should not be considered an economical site for domestic livestock. Its major use is as wildlife habitat for moose, caribou, and black bear, as well as small animals and birdlife.

The reference plant community has been determined by study of rangeland relict areas. Descriptions of areas protected from excessive grazing, trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities

1.1. Willow/Sedge-Rush/Sphagnum

State 1
Reference State

This ecological site is characterized by a diverse assemblage of sedges (Carex spp.), grasses, dwarf birch (*Betula nana*), bog blueberry (*Vaccinium uliginosum*), and willow (Salix spp.) with occasional stands of black spruce (*Picea mariana*). Sphagnum moss frequently occurs as a dense cover. The deepest parts of these depressions may support open water. Removal of vegetation cover on bog areas create open water of shallow lakes and marshes.

Dominant plant species

- black spruce (*Picea mariana*), tree
- Barclay's willow (*Salix barclayi*), shrub
- dwarf birch (*Betula nana*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- sedge (*Carex*), grass
- rush (*Juncus*), grass
- tufted hairgrass (*Deschampsia cespitosa*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous

Community 1.1
Willow/Sedge-Rush/Sphagnum

Barclay's willow (*Salix barclayi*), a composite of sedges (Carex spp.) and rushes (Juncus spp.), and potentially dense covering of sphagnum (Sphagnum spp.) is the dominant cover on these bogs. They are stable unless site hydrology is drastically interrupted. The community is highly variable depending on depth of standing water, soil pH and water table source, and historic disturbances.

Dominant plant species

- Barclay's willow (*Salix barclayi*), shrub
- sedge (*Carex*), grass
- rush (*Juncus*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous

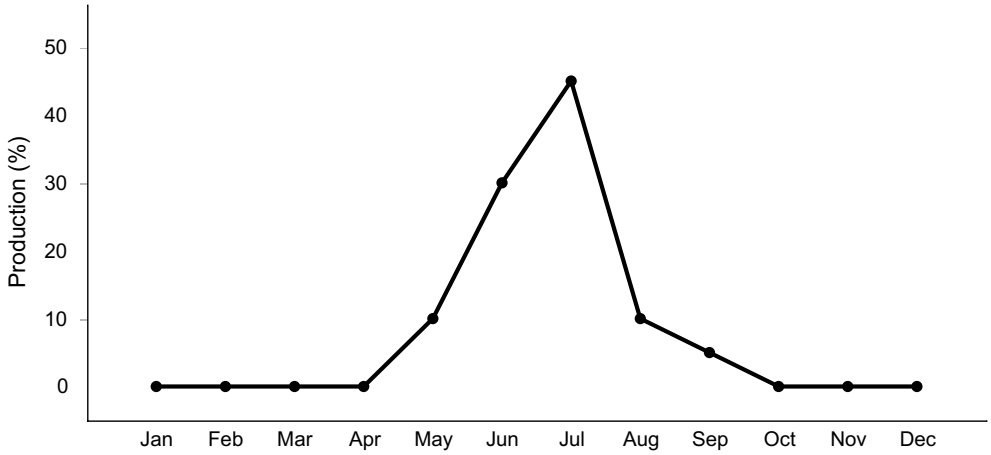

Figure 8. Plant community growth curve (percent production by month). AK0022, Southern. 60-200 days.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				–	
	sedge	CAREX	*Carex*	–	10–30
	rush	JUNCU	*Juncus*	–	10–30
	tufted hairgrass	DECE	*Deschampsia cespitosa*	–	5–10
	bluejoint	CACA4	*Calamagrostis canadensis*	–	5–10
	cottongrass	ERIOP	*Eriophorum*	–	2–10
Forb					
2				–	

	purple marshlocks	COPA28	*Comarum palustre*	–	5–10
	field horsetail	EQAR	*Equisetum arvense*	–	5–10
	yellow marsh marigold	CAPA5	*Caltha palustris*	–	3–5
	Canadian burnet	SACA14	*Sanguisorba canadensis*	–	1–5
	tall Jacob's-ladder	POAC	*Polemonium acutiflorum*	–	1–5
	violet	VIOLA	*Viola*	–	1–5
	arctic aster	EUSI13	*Eurybia sibirica*	–	1–2
	little yellow rattle	RHMI13	*Rhinanthus minor*	–	0–2
	dock	RUMEX	*Rumex*	–	0–2
	felwort	SWPE	*Swertia perennis*	–	0–2
	alpine bistort	POVI3	*Polygonum viviparum*	–	0–2
Shrub/Vine					
3				–	
	Barclay's willow	SABA3	*Salix barclayi*	–	5–20
	dwarf birch	BENA	*Betula nana*	–	5–15
	bog blueberry	VAUL	*Vaccinium uliginosum*	–	5–10
	Alaska bog willow	SAFU	*Salix fuscescens*	–	5–10
	marsh Labrador tea	LEPAD	*Ledum palustre ssp. decumbens*	–	5–10
	cloudberry	RUCH	*Rubus chamaemorus*	–	1–5
	black crowberry	EMNI	*Empetrum nigrum*	–	1–3
	strawberryleaf raspberry	RUPE	*Rubus pedatus*	–	1–2
	bog rosemary	ANPO	*Andromeda polifolia*	–	1–2
	shrubby cinquefoil	DAFR6	*Dasiphora fruticosa*	–	1–2
Tree					
4				–	
	black spruce	PIMA	*Picea mariana*	–	0–1
Moss					
5				–	
	sphagnum	SPHAG2	*Sphagnum*	–	25–75

Animal community

This site provides habitat for a great variety of wildlife. As a true wetland (bog), the amount of diversity of species will depend on the amount of water available. Moose and caribou are the dominant big game species on this ecological site. Fresh water shorebirds as well as waterfowl frequents this site.

Recreational uses

Snowmobiling and moose hunting comprise the majority of recreational activities. Occasionally blueberries can be found thick enough for berry picking. The variety of plant life found on this site, highlighted by cottongrass (Eriophorum spp.), can make interesting photography.

Wood products

No wood products are associated with this ecological site.

Other products

No known threatened or endangered plants or animals are indigenous to this ecological site.

Inventory data references

No field plots were available for this ecological site. A review of the scientific literature and professional experience were used to approximate the plant communities for this provisional ecological site. Information for the state-and-transition model was obtained from the same sources. All community phases are considered provisional based on these plots and the sources identified in ecological site description.

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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	01/22/2026
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):**

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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:**
