USDA Natural Resources
Conservation Service

Ecological site R224XY202AK
Drainage Complex Provisional Ecological Site Group

Last updated: 6/13/2025
Accessed: 12/22/2025

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
- 16150 Western North American Boreal Lowland Large River Floodplain Forest and Shrubland

- 16160 Western North American Boreal Riparian Stringer Forest and Shrubland (Landfire, 2024)

Ecological site concept

- This ecological site is a complex of hydrologically driven communities along riparian systems associated with drainageways
- poorly to very poorly drained soils
- Shallow to very deep soils
- Water table is present proximal to drainage but decreases as one moves distally from drainage

Associated sites

F224XY204AK	**Mixed Forest/Meadow Flood Plains Provisional Ecological Site Group** This flood plain ecological group is generally restricted to broad river valley systems. Flood plains have lost the direct connectivity to the water table and are influenced by the overland flow rather than a water table.

Similar sites

R224XY201AK	**Depressions and Seep Provisional Ecological Site Group** Wetland complexes will be associated with still or stagnant type water systems and have a higher degree of peat and organic build up than this ecological site. Ponding is the major influencer of area vegetation, with a dense layer of sphagnum mosses common.

Table 1. Dominant plant species

Tree	(1) *Betula papyrifera* (2) *Picea mariana*
Shrub	(1) *Salix* (2) *Alnus*
Herbaceous	(1) *Calamagrostis canadensis* (2) *Carex*

Physiographic features

This ecological site is associated with soils on low to steep gradient slopes that support a shallow to moderately deep-water table near channel edges (i.e., banks of rivers, streams, and other small drainages). Water table depth is directly influences vegetation. Elevation ranges from 50 to 1,800 feet. This system shifts at higher elevations but supports similar vegetation up to 4,500 feet. The landforms currently captured in correlations misrepresents the function of this ecological site as a drainage across the listed landforms.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Moraine (3) Till plain (4) Drainageway (5) Channel
Runoff class	Medium
Flooding frequency	None to very frequent
Ponding frequency	None
Elevation	15–549 m
Slope	2–30%
Water table depth	0–61 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	15–1,372 m
Slope	0–45%
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

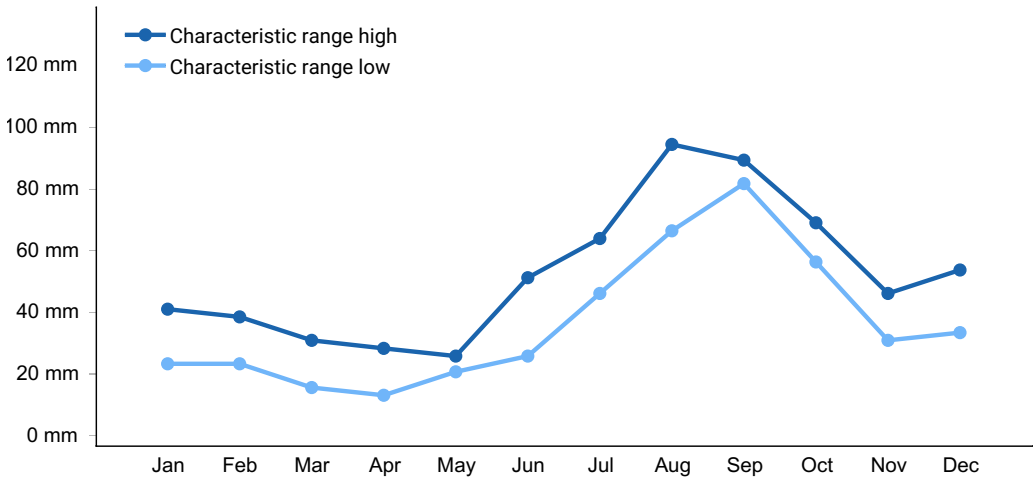


Figure 1. Monthly precipitation range

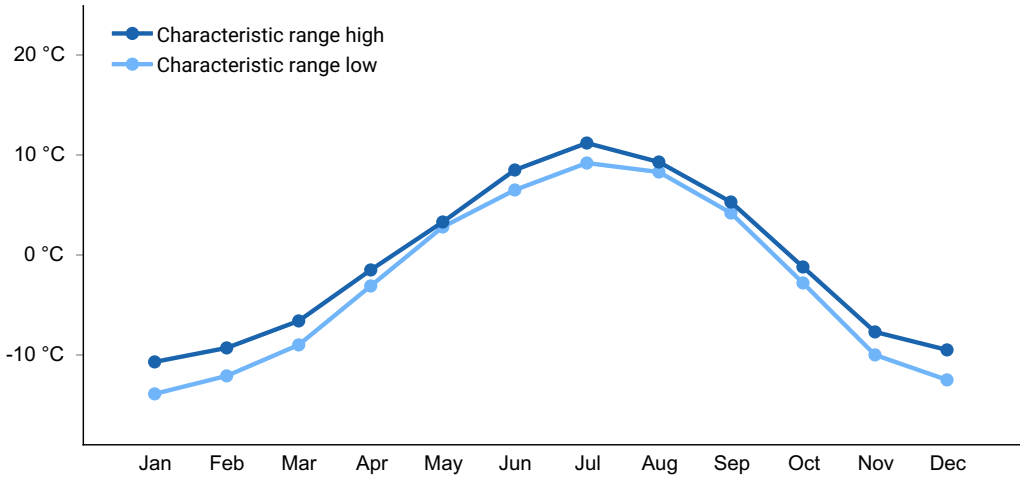


Figure 2. Monthly minimum temperature range

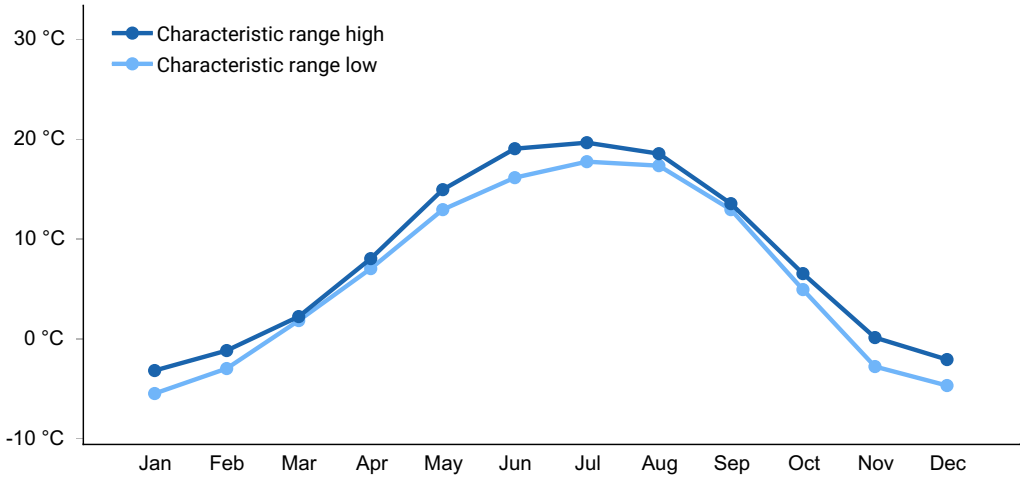


Figure 3. Monthly maximum temperature range

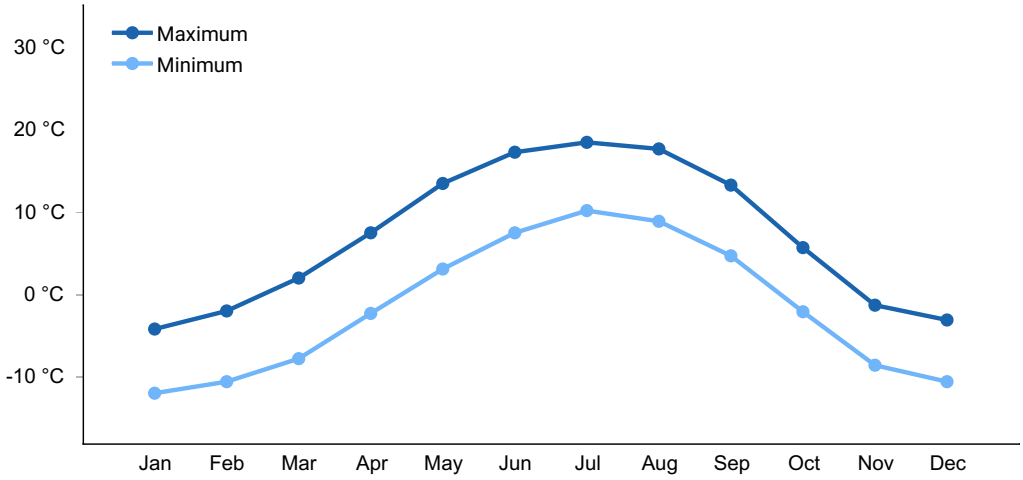


Figure 4. Monthly average minimum and maximum temperature

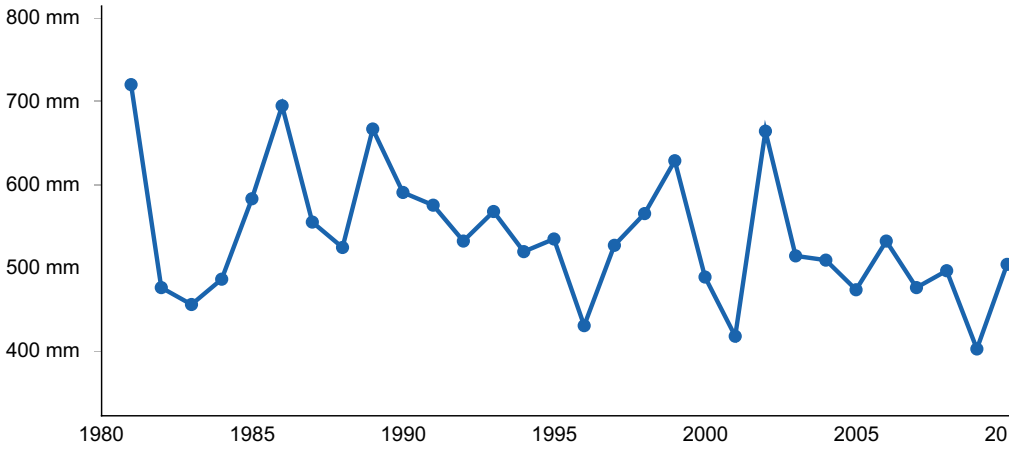


Figure 5. Annual precipitation pattern

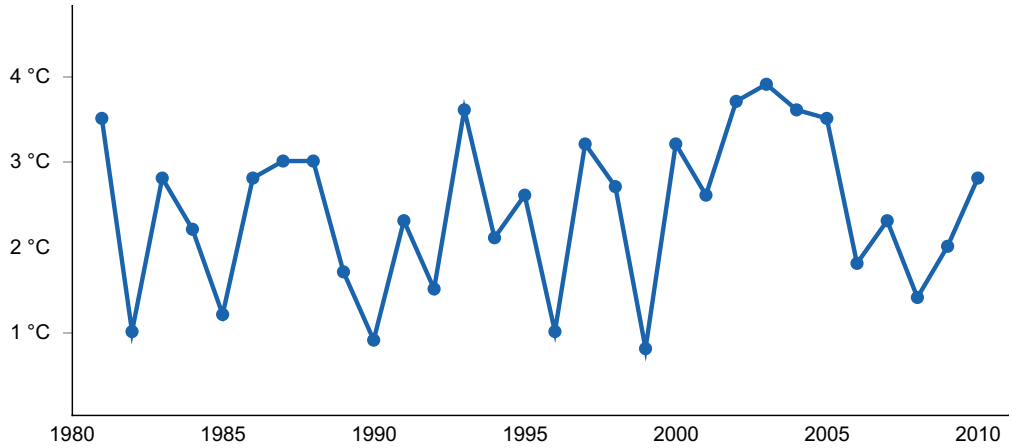


Figure 6. Annual average temperature pattern

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. There may be occasional ponding in back channels during periods of peak snow melt. Overland flow from upland runoff collects within the drainage system. Sediments and extreme runoff events are a threat but less of a driving factor. This ecological site is directly tied to stream systems and is an integral part of a healthy riparian system.

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

Soils are very deep. There is no restrictive layer. Soils are classified as poorly to very poorly drained. Soils formed in alluvium or till. An organic horizon, when present, is less than 10 inches thick. Soils are extremely to strongly acidic in the top ten inches. Available water capacity is high.

Table 5. Representative soil features

Parent material	(1) Ash flow (2) Loess (3) Till (4) Alluvium (5) Glaciofluvial deposits
Surface texture	(1) Silt loam (2) Silt loam (3) Peat (4) Muck
Drainage class	Very poorly drained to poorly drained
Permeability class	Moderate to slow
Depth to restrictive layer	152 cm
Soil depth	152 cm
Surface fragment cover <=3"	0–35%
Surface fragment cover >3"	0–50%
Available water capacity (0-101.6cm)	23.62–28.19 cm
Soil reaction (1:1 water) (0-25.4cm)	4–5.5
Subsurface fragment volume <=3" (0-152.4cm)	1–15%
Subsurface fragment volume >3" (0-152.4cm)	0–5%

Table 6. Representative soil features (actual values)

Drainage class	Very poorly drained to well drained
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 (0-101.6cm)	22.35–30.73 cm
Soil reaction (1:1 water) (0-25.4cm)	Not specified
Subsurface fragment volume <=3" (0-152.4cm)	1–16%
Subsurface fragment volume >3" (0-152.4cm)	0–5%

Ecological dynamics

This ecological site complex groups the landform by function rather than soil characteristics. In hydrologically driven systems, vegetation is more influenced by the water table and surface flooding and ponding than by general soil properties. Hydrologic factors such as depth to water table, surface ponding depth, and flooding frequency and length often occur along a gradient. This makes it difficult to describe distinct plant communities.

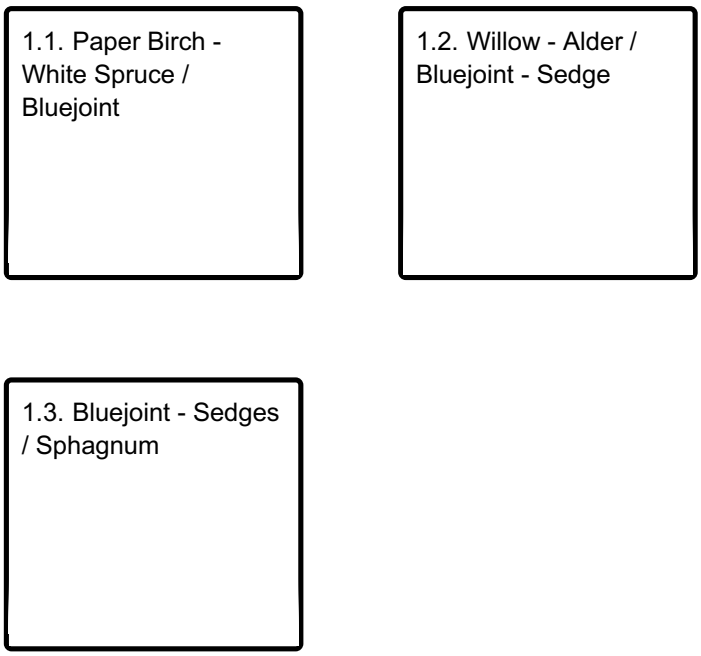
In this ecological site, vegetation diversity tends to be shaped by the ability of plants to find a specific niche and adapt over time. For example, a peat bog can be dominated by several unique plant communities within one growing season due to a natural, fluctuating water table. These different communities are grouped into a single ecological complex here. Generally, no distinction can be made between the disturbance or seral condition of the complexed plant communities.

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities



State 1
Reference State

Vegetation throughout this ecological site is a mosaic of mixed paper birch-white spruce (*Betula papyrifera-Picea glauca*) forest (typically on a slight rise above a minor flood plain) in the drier zone, tall alder (Alnus spp.) and alder-willow (Salix spp.) scrub on the moist zone, and small areas or thin bands of graminoid meadows in the wet zone.

Dominant plant species

- paper birch (*Betula papyrifera*), tree
- white spruce (*Picea glauca*), tree
- willow (*Salix*), shrub
- alder (*Alnus*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- sedge (*Carex*), grass
- calliergon moss (*Calliergon*), other herbaceous
- drepanocladus moss (*Drepanocladus*), other herbaceous

Community 1.1
Paper Birch - White Spruce / Bluejoint

The community of mixed paper birch (*Betula papyrifera*) - white spruce (*Picea glauca*) open woodland occurs on the fringes or transition between the flood plain and riparian channel. The community will occur as a mosaic within the other communities as well, especially along channels that are highly sinuous. Bluejoint (*Calamagrostis canadensis*) will be the prominent understory cover with mosses being the ground cover.

Dominant plant species

- paper birch (*Betula papyrifera*), tree
- white spruce (*Picea glauca*), tree
- bluejoint (*Calamagrostis canadensis*), grass
- Moss (*Moss*), other herbaceous

Community 1.2
Willow - Alder / Bluejoint - Sedge

The bluejoint-Sedge/Willow-Alder community frequently occurs on hummocky or broken ground just back from the wettest part of the channel. The tall herbs include bluejoint (*Calamagrostis canadensis*), sedges (Carex spp.), nootka lupine (*Lupinus nootkatensis*), and western yarrow (Achillea millifolium var occidentalis). The woody canopy consists primarily of willow species, particularly Barclay's willow (*Salix barclayi*i) and thinleaf alder (*Alnus incana* ssp. tenifolia). Low areas, or depressions between shrubs, increase in bryophytes or mosses (Drepanocladus and Calliergon) will occur.

Dominant plant species

- Barclay's willow (*Salix barclayi*), shrub
- thinleaf alder (*Alnus incana ssp. tenuifolia*), shrub
- willow (*Salix*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- sedge (*Carex*), grass
- Nootka lupine (*Lupinus nootkatensis*), other herbaceous
- western yarrow (*Achillea millefolium var. occidentalis*), other herbaceous

Community 1.3
Bluejoint - Sedges / Sphagnum

This plant community is inundated frequently and may or may not be hummocky. The dominant vegetation is bluejoint (*Calamagrostis canadensis*), sedges (Carex spp.), and rushes (Juncus spp.). Isolated areas of dispersed resin birch (*Betula glandulosa*), sweetgale (*Myrica gale*), and leatherleaf (*Chamaedaphne calyculata*) may occur. This community may be very similar to the Depression Complex; specific species will vary between the stagnant or ponded water of depressions and the flowing water of the Drainage Complex.

Dominant plant species

- resin birch (*Betula glandulosa*), shrub
- sweetgale (*Myrica gale*), shrub
- leatherleaf (*Chamaedaphne calyculata*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- sedge (*Carex*), grass
- tufted hairgrass (*Deschampsia cespitosa*), grass
- sphagnum (*Sphagnum*), other herbaceous

- horsetail (*Equisetum*), other herbaceous
- purple marshlocks (*Comarum palustre*), other herbaceous

Additional community tables

Animal community

This ecological site produces moderately abundant browse for moose and provides excellent hiding cover. Small streams provide habitat for trout, grayling, and salmon.

Recreational uses

Sport fishing and limited moose hunting are the major recreational activities on this ecological site. It would not be considered a good area for hiking due to the dense brush cover and pockets of water hidden by grass.

Wood products

Limited wood products are available and may be limited to personal firewood collection and willow and alder for cuttings and handcraft items.

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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Contributors

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Acknowledgments

The original site concepts for the Loamy slopes was created and published by Karin Sonnen, the State Grazing/Rangeland Management Specialist for Alaska in May of 2010.

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	12/22/2025
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:**

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:

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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:**
