USDA Natural Resources
Conservation Service

Ecological site R228XY712AK
Black spruce/ericaceous scrub woodland slopes

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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): 228X–Interior Alaska Mountains

Physiography
The Interior Alaska Mountains Major Land Resource Area (MLRA) (228X) includes portions of the high mountain slopes, hills, and plains of the Alaska Range, Talkeetna Mountains, Chugach Mountains, Wrangell Mountains and the northern Aleutian Range. This MLRA comprises 54,205 square miles and consists of rugged, high mountains and low, rounded hills and extended footslopes along the base of the mountains. Most of the area is undeveloped wildland and includes true alpine and subalpine life zones. Geology consists of sedimentary, metamorphic, and igneous bedrock. Climate is considered continental subarctic.

MLRA boundaries
MLRA 228X is expansive and therefore shares a boundary with many MLRAs. Boundaries with other mountainous MLRAs such as 222X (Southern Alaska Coastal mountains), 223X (Cook Inlet Mountains), and 225X (Southern Alaska Peninsula Mountains) result from orogenic differences (225X,223X) or variation in climate (222X). Other MLRAs such as 236X (Bristol-Bay-Northern Alaska Peninsula Lowlands), 227X (Copper River Basin), 229X (Interior Alaska Lowlands), and 230X (Yukon-Kuskokwim Highlands) have distinct physiographic boundaries where steep mountains meet lowlands, basins, and floodplains.

Waterways
Encompassed within the Pacific Mountain system, the mountains of MLRA 228X are dissected by high-gradient valleys with braided floodplains in the valley bottoms. Glaciers, snowfields, and ice fields make up 15 percent of the area and elevations range from about 1,500 feet in the Copper River Basin to 20,320 feet at the summit of Denali. The major

rivers of this MLRA include the Tanana, Kuskokwim, and Copper, and drain into the Bering Sea (Tanana, Kuskokwim), and the Gulf of Alaska (Copper). The headwaters of the Susitna River are part of this MLRA and drain into Cook Inlet through the Cook Inlet Mountains, and Cook inlet Lowlands (MLRA 223X and 224X, respectively). This MLRA is in the zone of discontinuous permafrost, where permafrost mostly occurs in fine-textured soils on gently sloping landforms and/or on northerly aspects.

Geology
Except for the highest peaks and upper ridges, all of this area was glaciated during the late Pleistocene. Glacial deposits have mostly eroded or have been buried by colluvium and alluvium throughout the Holocene, yet some highly modified glacial deposits remain at lower elevations on low mountain slopes and valleys. Loess also occurs at lower elevations, and most valley bottoms have been buried by recent alluvial deposits. Bedrock geology is comprised of sedimentary, metamorphic, igneous, and volcanic rock, and gold mining does take place in this MLRA.

Soils
The dominant soil orders in MLRA 228X are Gelisols, Inceptisols, Spodosols, and Entisols. The Gelisols are shallow or moderately deep to permafrost, occur on finer textured sediments, and are poorly drained or very poorly drained. Common Gelisol suborders are Histels, Orthels, and Turbels. The Histels have thick accumulations of surface organic material and occur in depressions and peat plateau. The Orthels and Turbels have comparably thinner surface organic material and occur on drainageways, stream terraces, and outwash plains. The Inceptisols, Spodosols, and Entisols lack permafrost in the soil profile. Spodosols are formed from weathering processes that strip organic matter combined with aluminum from upper horizons and deposit them into lower horizons. Entisols and Inceptisols are characteristically undeveloped, with Inceptisols exhibiting only moderate weathering and development while Entisols exhibit little to no evidence of development at all. Soils have a subgelic or cryic temperature regime with aquic or udic moisture regime and mixed minerology. Miscellaneous areas make up 58 percent of this MLRA and are classified as rock outcrop, rubble land, and glaciers.

Climate
The climate of this area is characterized by brief, cool summer, and long, cold winters, but extreme variation in elevation results in a wide range of climatic conditions. Average annual precipitation ranges from 15 to 20 inches at lower elevations to 100 inches at high elevations. Rainfall is generally highest in July, August, and early September. The average annual snowfall ranges from 70 to 400 inches, and the average annual temperature at Denali Park headquarters is 27 degrees F. Freeze-free period ranges from 50 to 80 days, but at higher elevations, freezing temperatures can occur at any point throughout the year.

Vegetation
The Interior Mountains MLRA is defined by subalpine and alpine life zones; therefore, true forested communities do not occur and are restricted to surrounding lowland MLRAs. Black and white spruce trees do occur in the subalpine zone, but are often sporadic, and

exhibit Krummholz (stunted and/or crooked) growth forms and do not produce viable seed. Subalpine vegetation is characterized by birch-willow scrublands or spruce-scrub woodlands on loamy, stable mountain slopes. Unstable, colluvial slopes are typically dominated by alder scrub communities which can, on occasion, include scattered black and white spruce. Willow typically dominates drainages, while wet, poorly to very poorly drained swales are comprised of tussock sedge-scrub species. Low birch-ericaceous scrub communities climb up mountain slopes until they are replaced by dryas-ericaceous dwarf scrub communities in the true alpine zone. Lichen also plays an important role in skeletal and bedrock-controlled high elevation mountain slopes, ridges, and summits. There is generally little to no plant growth at elevations above 7,500 feet (USDA, 2022).

LRU notes

This area supports two life zones defined by the physiological limits of plant communities along an elevational gradient: subalpine, and alpine. In this area, the boreal life zone occurs below 2500 feet elevation on average, and is relegated to surrounding, lowland MLRAs. The subalpine zone is typically a narrow transitional band between the boreal and the alpine life zones, and is characterized by sparse, stunted trees. In the subalpine, certain types of birch and willow shrub species grow at over one meter in height (commonly Betula glandulosa and Salix pulchra). In the alpine, trees no longer occur, and all shrubs are dwarf or lay prostrate on the ground. The transition between boreal and alpine vegetation can occur within a range of elevations, and is highly dependent on slope, aspect, and shading from adjacent mountains.

Within each life zone, there are plant assemblages that are typically associated with cold slopes and warms slopes. Cold slopes and warm slopes are created by the combination of the steepness of the slope, the aspect, and shading from surrounding ridges and mountains. Warm slope positions typically occur on southeast to west facing slopes that are moderate to very steep (over 10 percent slope) and are not shaded by the surrounding landscape. Cold slopes typically occur on northwest to east facing slopes, occur in shaded slope positions, or occur in low-lying areas that are cold air sinks. Examples of shaded positions include head slopes, low relief backslopes of hills, and the base of hills and mountains shaded by adjacent mountain peaks. These warm and cold slopes can shift the elevation at which life zones occur. Warm slopes can allow communities to persist at higher elevations, while cold slopes can restrict these same communities to lower elevations.

Classification relationships

Alaska Vegetation Classification
Black spruce needleleaf woodland (I.A.3.d. – level IV)
(Viereck et al. 1992)

Circumboreal Vegetation Map – Alaska-Yukon Region
Alaska-Yukon Wet Black Spruce Woodlands and Scrub Coniferous

(Jorgensen and Meidinger, 2015)

LANDFIRE Biophysical Settings
7416220 – Western North American Boreal Black Spruce Wet-Mesic Slope Woodland
(LANDFIRE biophysical settings, 2009)

Ecological site concept

• Ecological site R228XY712AK is a subalpine black spruce/birch/ericaceous scrub community on mountain slopes, hillslopes, valleys, and glacial till plains
• Very poorly to poorly drained soils formed in organic material and loess over glacial till and gravelly residuum.
• Elevations range from 1730 to 3500 feet
• Occurs on north-facing aspects and plant community is influenced by presence of permafrost and a shallow, persistent water table
• The representative plant community is characterized by a black spruce needleleaf woodland (Viereck et al., 1992)

Associated sites

R228XY714AK	**Mixed spruce/birch-ericaceous scrub woodland mesic slopes** The white spruce/willow-birch scrub mesic slopes ecological site occurs adjacent to the black spruce/ericaceous scrub woodland slopes on soils that have slightly better drainage. Although white spruce will outcompete black spruce on mesic slopes, black spruce can still comprise a significant portion of the overstory community.

Similar sites

R228XY713AK	**Alpine tussock tundra hummocks** The alpine scrub earth hummocks ecological site occurs on similar soils in the alpine life zone and will support a similar plant community comprised of dwarf ericaceous scrub and sphagnum without the presence of black spruce. Both ecological sites occur on poorly to very poorly drained soils.

Table 1. Dominant plant species

Tree	(1) *Picea mariana*
Shrub	(1) *Betula nana* (2) *Ledum groenlandicum*
Herbaceous	(1) *Sphagnum* (2) *Carex bigelowii*

Physiographic features

Ecological site R228XY712AK occurs in the subalpine zones on mountain slopes, hill slopes, valleys and glacial till plains. Elevations range from1730 to 3500 feet on slopes ranging from 2 to 25 percent. This site is associated with cold slopes, with aspects oriented generally north to northeast. A shallow water table persists within 0 to 10 inches of the soil surface throughout most of the growing season and has a strong influence on the plant community that occupies this site.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Mountains > Till plain (3) Mountains > Hillslope (4) Mountains > Valley
Runoff class	Very low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	1,730–3,500 ft
Slope	2–25%
Water table depth	0–10 in
Aspect	NW, N, NE, E

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified
Ponding frequency	None to frequent
Elevation	1,460–4,830 ft
Slope	0–25%
Water table depth	Not specified

Climatic features

The climate of this high-elevation area is characterized by short growing season, cool summers, and long winters. Mean annual precipitation is around 15 inches at lower elevations but can reach much higher totals at higher elevations. June, July, and August are the wettest months of the year, while February, March, and April are the driest. On average, there are 17 frost free days per year, but at high elevations, freezing temperatures can occur any month of the year. The mean maximum temperature is 67 degrees Fahrenheit in July, while the mean low temperature is -9 degrees Fahrenheit in January. At higher elevations, this temperature range will be greatly skewed towards

colder temperatures.

Table 4. Representative climatic features

Frost-free period (characteristic range)	5-30 days
Freeze-free period (characteristic range)	63-77 days
Precipitation total (characteristic range)	12-17 in
Frost-free period (actual range)	1-41 days
Freeze-free period (actual range)	50-84 days
Precipitation total (actual range)	12-18 in
Frost-free period (average)	17 days
Freeze-free period (average)	69 days
Precipitation total (average)	15 in

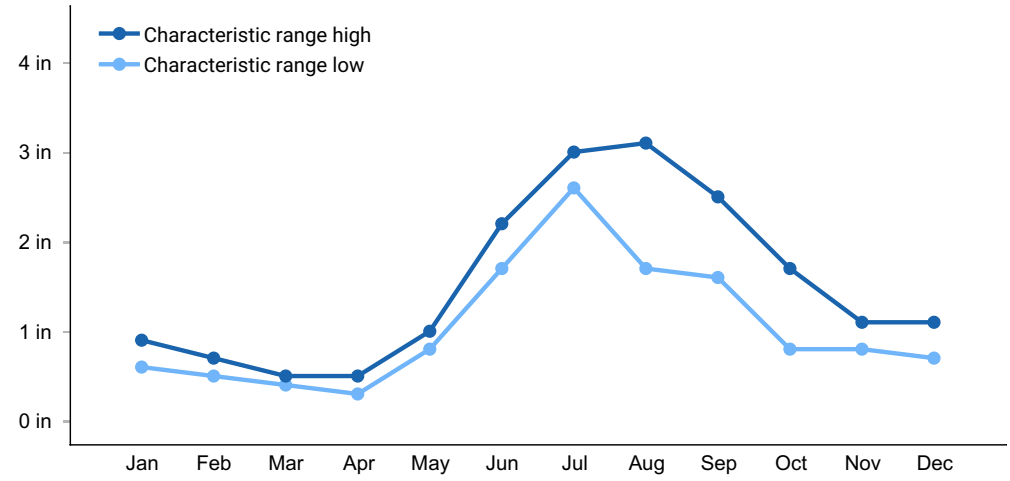


Figure 1. Monthly precipitation range

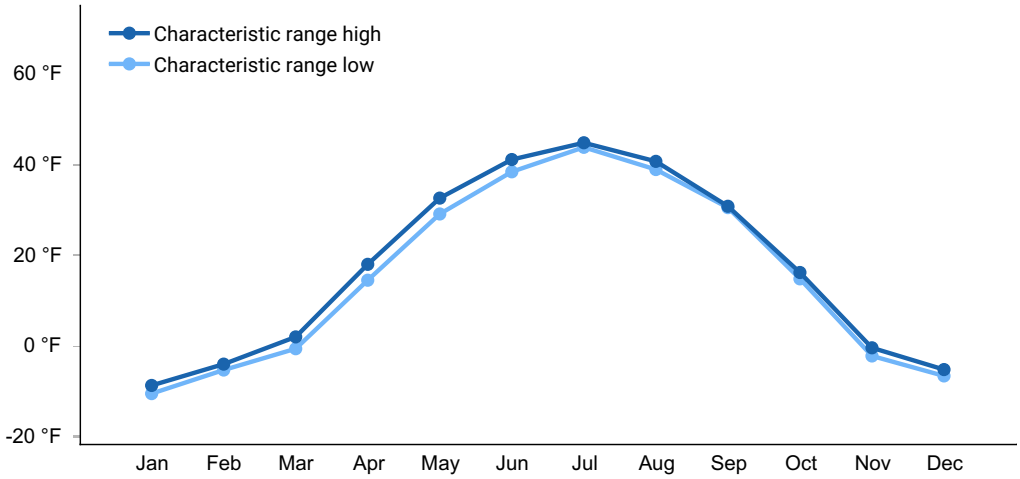


Figure 2. Monthly minimum temperature range

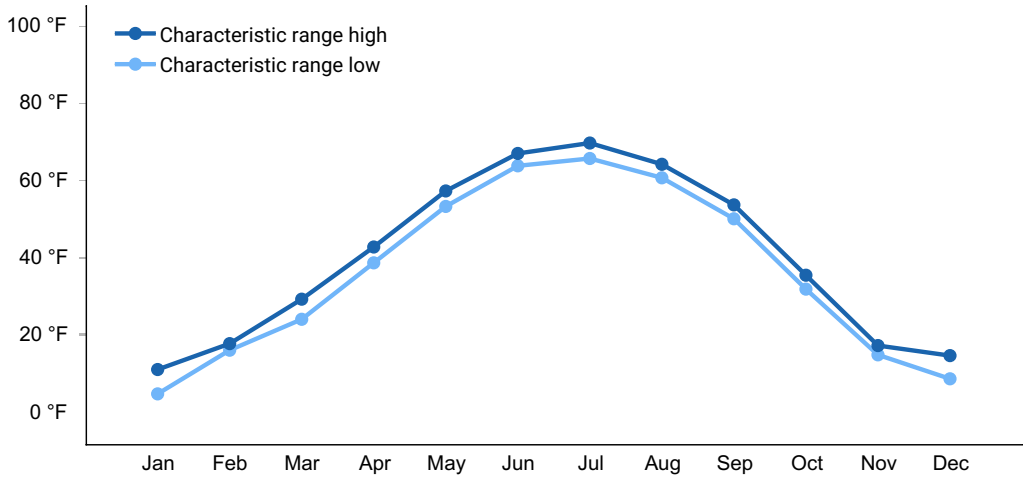


Figure 3. Monthly maximum temperature range

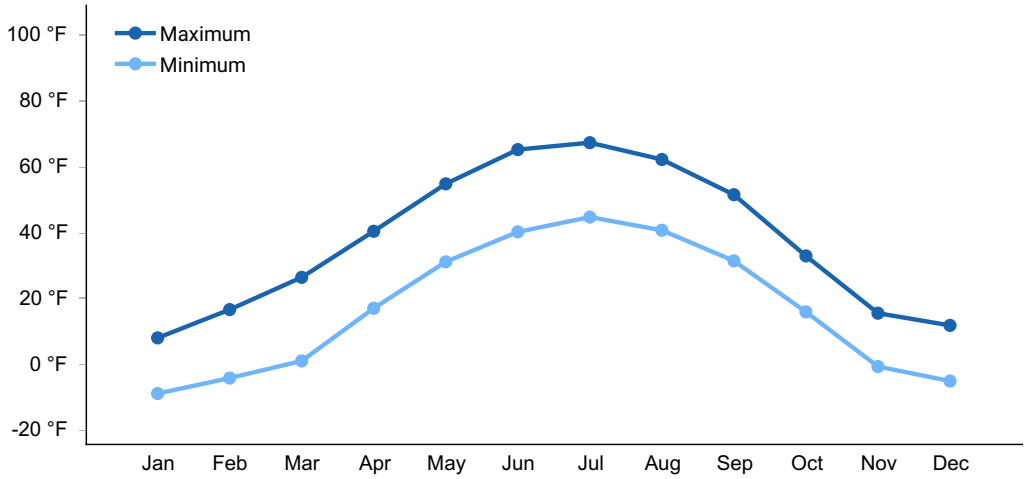


Figure 4. Monthly average minimum and maximum temperature

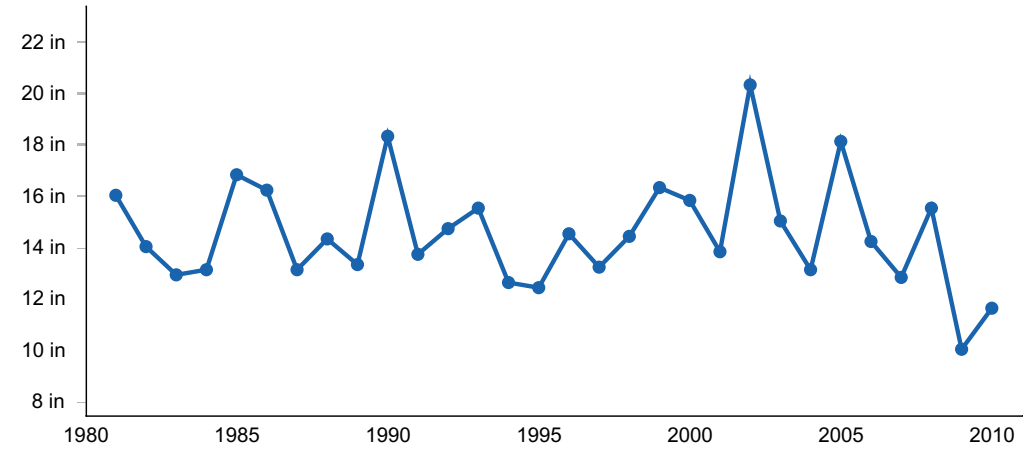


Figure 5. Annual precipitation pattern

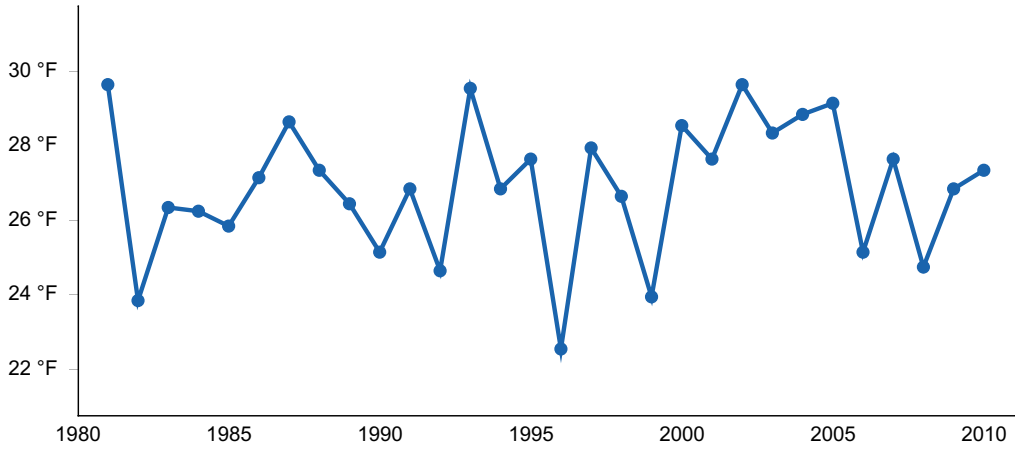


Figure 6. Annual average temperature pattern

Climate stations used

- (1) TONSINA [USC00509385], Copper Center, AK
- (2) NABESNA [USC00506147], Gakona, AK
- (3) PAXSON [USC00507097], Copper Center, AK
- (4) CANTWELL 2 E [USC00501243], Cantwell, AK
- (5) MCKINLEY PARK [USC00505778], Healy, AK
- (6) FAREWELL LAKE [USC00503009], Mc Grath, AK

Influencing water features

This ecological sites has a water table that persists throughout the growing season within 0 to 10 inches of the soil surface and affects the plant community.

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

The soils of ecological site R228XY712AK formed in organic material and loess over glacial till and gravelly residuum. Surface fragments are not common and surface textures are peat. The mineral soil is considered loamy-skeletal and restrictive layers in the form on strongly contrasting textural stratification or permafrost occur between 12 and 18 inches of the soil surface. Soil depth is controlled by lithic contact which typically occurs at deep and very deep depths. Soil pH is acidic. Drainage class is rated as very poorly to poorly drained.

Table 5. Representative soil features

Parent material	(1) Organic material (2) Loess (3) Residuum (4) Till
Surface texture	(1) Peat
Family particle size	(1) Loamy-skeletal
Drainage class	Very poorly drained to poorly drained
Permeability class	Moderately rapid to rapid
Depth to restrictive layer	12–18 in
Soil depth	59–60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	3.3–4 in
Calcium carbonate equivalent (0-40in)	0%
Clay content (0-20in)	5–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–3
Soil reaction (1:1 water) (0-40in)	4.6–6
Subsurface fragment volume <=3" (0-60in)	0–25%
Subsurface fragment volume >3" (0-60in)	0–5%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Depth to restrictive layer	7–60 in
Soil depth	51–60 in
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified

Available water capacity (0-10in)	2.8–4.9 in
Calcium carbonate equivalent (0-40in)	Not specified
Clay content (0-20in)	5–30%
Electrical conductivity (0-40in)	Not specified
Sodium adsorption ratio (0-40in)	Not specified
Soil reaction (1:1 water) (0-40in)	4–6.8
Subsurface fragment volume <=3" (0-60in)	0–49%
Subsurface fragment volume >3" (0-60in)	0–24%

Ecological dynamics

Growing conditions

Located in the subalpine life zone, ecological site R228XY712AK is exposed to a variety of harsh conditions including high winds, persistent snowpack, and extremely cold temperatures. Persistent snowpack and cold temperatures reduce the growing season at high elevations, when compared to lower elevations. Although tree species can continue to grow in the subalpine zone, they are at the edge of their range and therefor exhibit diminished growth forms. Tree cover in the subalpine is less than 25 percent, which designates this ecological site as a woodland, rather than a forest. This is caused by stress from harsh growing conditions which limits the tree’s ability to produce viable seeds. As elevation increases, tree cover decreases until it is completely replaced by shrubby vegetation.

Disturbance

Although fire plays an important role in shaping plant communities across Alaska, fire frequency in high elevation communities is largely unstudied, when compared to interior forest stands. Most wildfires in Alaska are caused by lightning strikes which tend to occur near tree line, decreasing in frequency into the subalpine and alpine zones (Dewilde et al, 2006). Despite the propensity of fires to move from boreal stands upslope into higher life zones, it is likely a general lack of fuel in scrub communities that accounts for diminished fire frequency (Kasischke et al. 2002, Dewild et al. 2006). Given the influence of a seasonal water table on this wetland ecological site, fire is even less likely to occur when compared to surrounding alpine and subalpine scrub communities. The disturbance

regime in this community is likely driven by avalanche, rockslides, and other mass movement events associated with eroding, unstable mountain slopes coupled with substantial snowfall.

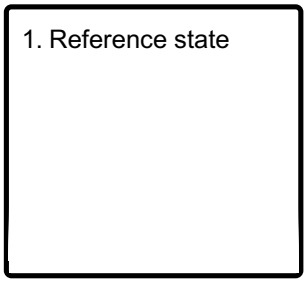
Permafrost
This ecological site is associated with cold slopes on north-facing aspects. This orientation encourages permafrost development, which affects soil water holding capacity and rooting depth, selecting for the plant community that occupies this ecological site. Although fire is less prevalent in subalpine and alpine communities, it can and will likely occur in lower subalpine woodlands. If a fire burns slowly through this ecological site, there is potential that it could remove the organic mat which insulates permafrost. If this occurs, the permafrost can start to degrade, and in extreme cases thermokarst can occur. This process has not been identified on this ecological site, but thermokarst is becoming increasingly common throughout interior Alaska, and therefore it is worth mentioning.

Reference community 1.1

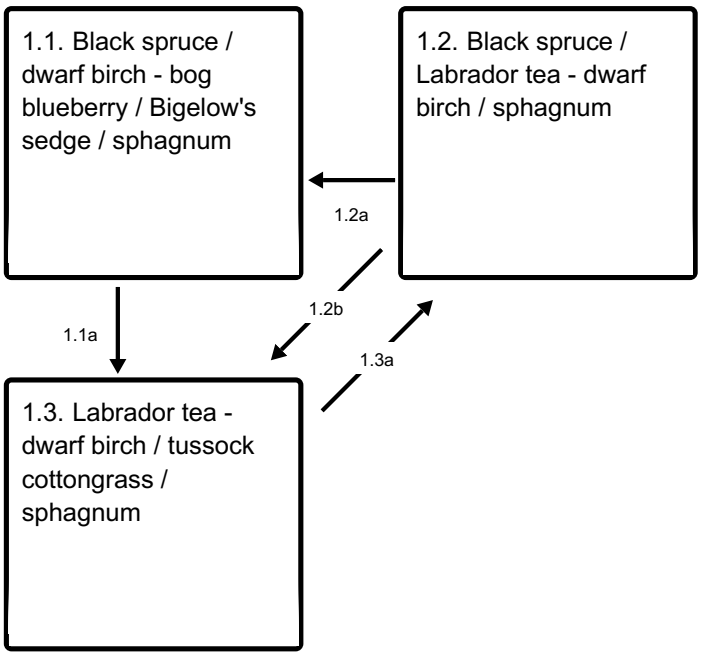
Field data suggest a single reference state is associated with ecological site R228XY712AK. The reference plant community (1.1) is characterized by a black spruce needleleaf woodland (Viereck et al., 1992). Notable plant species include black spruce (*Picea mariana*), dwarf birch (*Betula nana*), cloudberry (*Rubus chamaemorus*), bog blueberry (*Vaccinium uliginosum*), bog Labrador tea (*Ledum groenlandicum*), Bigelow's sedge (*Carex bigelowii*), sphagnum, Schreber's big redstem moss (Pluerozium schreberi), and splendid feather moss (*Hylocomium splendens*). Black spruce will decrease in cover as elevation increases, and eventually this community will become a birch/ericaceous scrubland.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - Fire

1.2a - Time without fire

1.2b - Fire

1.3a - Time without fire

State 1
Reference state

The reference community for this ecological site is characterized by a black spruce needleaf woodland (Viereck et al., 1992). As elevation increases, black spruce decreases in cover and is replaced by dwarf birch. Common species include bog blueberry, Labrador tea, crowberry, cloudberry, Bigelow's sedge, and sphagnum moss.

Dominant plant species

- black spruce (*Picea mariana*), tree
- black crowberry (*Empetrum nigrum*), shrub
- cloudberry (*Rubus chamaemorus*), shrub
- bog Labrador tea (*Ledum groenlandicum*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- dwarf birch (*Betula nana*), shrub
- Bigelow's sedge (*Carex bigelowii*), grass
- sphagnum (*Sphagnum*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous
- greygreen reindeer lichen (*Cladina rangiferina*), other herbaceous

Community 1.1
Black spruce / dwarf birch - bog blueberry / Bigelow's sedge / sphagnum

The reference community is characterized as a black spruce needleleaf woodland (Viereck et al., 1992). Black spruce cover is less than 25 percent, meeting the woodland classification. As elevation increases, black spruce cover decreases while dwarf birch cover increases. This community includes low and dwarf shrubs (less than three feet in height), medium graminoids (less than three feet in height) and moss. Notable species include Labrador tea, cloudberry, bog blueberry, lingonberry, Bigelow's sedge, and sphagnum moss.

Dominant plant species

- black spruce (*Picea mariana*), tree
- black crowberry (*Empetrum nigrum*), shrub
- dwarf birch (*Betula nana*), shrub
- bog Labrador tea (*Ledum groenlandicum*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- cloudberry (*Rubus chamaemorus*), shrub
- Bigelow's sedge (*Carex bigelowii*), grass
- tall cottongrass (*Eriophorum angustifolium*), grass
- sphagnum (*Sphagnum*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous
- greygreen reindeer lichen (*Cladina rangiferina*), other herbaceous

Community 1.2
Black spruce / Labrador tea - dwarf birch / sphagnum

Community 1.2. is in the late stage of fire-induced secondary succession for this ecological site. It is characterized as dwarf tree scrub woodland (Viereck et al. 1992). Black spruce seedlings are abundant and tree cover primarily occurs in regenerative tree stratum. The soil surface is primarily covered with herbaceous litter and mosses. Common understory species include Labrador tea, lingonberry, dwarf birch, bog blueberry, tussock cottongrass, Bigelow's sedge, cloudberry, various Sphagnum moss, splendid feathermoss, and Schreber's big redstem moss. The understory vegetative strata that characterize this community are tree regeneration, low shrubs (between 8 and 36 inches), dwarf shrubs (less than 8 inches), and mosses.

Dominant plant species

- black spruce (*Picea mariana*), tree
- dwarf birch (*Betula nana*), shrub
- bog Labrador tea (*Ledum groenlandicum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub

- bog blueberry (*Vaccinium uliginosum*), shrub
- cloudberry (*Rubus chamaemorus*), shrub
- Bigelow's sedge (*Carex bigelowii*), grass
- tall cottongrass (*Eriophorum angustifolium*), grass
- sphagnum (*Sphagnum*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous

Community 1.3
Labrador tea - dwarf birch / tussock cottongrass / sphagnum

Community 1.3 is in the early stage of fire-induced secondary succession for this ecological site. This community is characterized as open low scrub (Viereck et al. 1992). Seedlings of black spruce are common but have limited cover. Common species include Labrador tea, dwarf birch, lingonberry, bog blueberry, small cranberry, tussock cottongrass, Bigelow's sedge, cloudberry, various Sphagnum, and juniper polytrichum moss. The strata that characterize this community are low shrubs (between 8 and 36 inches), medium graminoids (between 4 and 24 inches), and mosses.

Dominant plant species

- bog Labrador tea (*Ledum groenlandicum*), shrub
- dwarf birch (*Betula nana*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- cloudberry (*Rubus chamaemorus*), shrub
- tall cottongrass (*Eriophorum angustifolium*), grass
- Bigelow's sedge (*Carex bigelowii*), grass
- sphagnum (*Sphagnum*), other herbaceous
- juniper polytrichum moss (*Polytrichum juniperinum*), other herbaceous
- reindeer lichen (*Cladina*), other herbaceous

Pathway 1.1a
Community 1.1 to 1.3

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 typically removed. The pre-fire vegetation generally reestablishes quickly from below ground root systems and rhizomes.

Pathway 1.2a
Community 1.2 to 1.1

Time without fire. Black spruce seedlings and saplings mature into a needleleaf woodland.

Pathway 1.2b
Community 1.2 to 1.3

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 typically removed. The pre-fire vegetation generally reestablishes quickly from below ground root systems and rhizomes.

Pathway 1.3a
Community 1.3 to 1.2

Time without fire allows black spruce seedlings to establish as shrub cover increases.

Additional community tables

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.

Plant community composition is largely based on ecological sites from AK638: Soil Survey of Cantwell Area, Alaska.

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Contributors

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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	04/10/2026
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):**

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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):**

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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:**
