USDA Natural Resources Conservation Service

Ecological site R233XY148AK
Subalpine Scrub Gravelly Moist 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): 233X–Upper Kobuk and Koyukuk Hills and Valleys

The Upper Kobuk and Koyukuk Hills and Valleys MLRA (herein called area) occurs in Interior Alaska. This area makes up 8,405 square miles. The largest tributaries are the Kobuk and the Koyukuk Rivers. Major tributaries of the Kobuk are the Reed, Beaver, Mauneluk, and Pau Rivers. Major tributaries of the Koyukuk River are the Alatna, John, and Kanuti Rivers. This area is primarily undeveloped wildland and sparsely populated. The communities within or near this area are Bettles, Kobuk, and Shungnak.

The terrain of this area consists of broad, nearly level river valleys and basins and rolling uplands separated by isolated hills and low rounded mountains. In the river valleys, nearly level flood plains and stream terraces gradually transition to gently sloping to moderately steep slopes leading to the hills and mountains. Basins are on the Pau River Flats between the eastern Zane and Lockwood Hills, on the Kanuti Flats between the Kanuti and Koyukuk Rivers, and along the middle reaches of the Hogatza River. Basins and stream terraces are dotted with hundreds of lakes and interconnecting wetlands. Elevation ranges from about 150 feet in the western part of the area, at the confluence of the Kobuk and Mauneluk Rivers, to 4,765 feet at the summit of Fritts Mountain, in the Angaycuham Mountains.

Geology and Soils

The northern part of the area was covered repeatedly by Pleistocene glaciers originating in the Brooks Range to the north. Slightly modified to highly modified moraines and drift cover many of the rolling uplands. Glacial ice flowed over most of the hills and low mountains, removing existing deposits and leaving a thin layer of glacial deposits. Today,

the lower mountain slopes, hills, and valley bottoms are covered with a variety of material, including glacial drift, colluvium, slope alluvium, fluvial deposits, and silty loess. In the southern part of the area, basins and valleys are filled with Quaternary glaciofluvial and fluvial deposits. Hills and upland slopes are covered with bedrock colluvium and slope alluvium, which are mantled with loess in places. The bedrock geology underlying much of the area consists dominantly of Permian through Lower Cretaceous stratified sedimentary and volcanic rocks.

This area is in the zone of discontinuous permafrost. Permafrost is close to the surface in lands with finer textured sediments throughout the area. Isolated masses of ground ice occur on terraces and the lower side slopes of hills. Permafrost does not occur on flood plains, on steep south-facing slopes, or other lands with very gravelly soils. Periglacial features, such as thermokarst pits, peat plateaus, and earth hummocks, are on the lower hill and mountain slopes and in upland valleys.

The dominant soil orders in this area are Gelisols, Inceptisols, 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, lake margins, and peat plateau. The Orthels and Turbels have comparably thinner surface organic material and occur on stream terraces and hill and upland slopes. The Inceptisols and Entisols are typically associated with gravelly soils that do not have permafrost within their profile, are deep, and are somewhat poorly drained to well drained. The common Inceptisol suborders are Cryepts and Gelepts both of which occur on upland and mountain slopes. Cryepts occur under forested soils at lower elevations and Gelepts on alpine tundra at higher elevations. Common Entisol suborders are Cryofluvents and Cryorthents both of which occur on alluvium on flood plains. Miscellaneous (non-soil) areas make up about 8 percent of this MLRA. The most common are rock outcrop, rubble land, and water.

Wildfires disturb the insulating organic material at the soil surface and can change the presence and/or depth of permafrost in the soil profile. These fire related changes to permafrost can also change the depth and presence of perched water tables. Gelisols that burn in this area can change soil taxonomic classification. For instance, depending on fire-severity, Histels may change to Orthels and Orthels may change to Inceptisols. Depending on the frequency and intensity of fires, landform position, and soil texture, the soils may or may not revert back to their original taxonomic classification.

Climate

Short, warm summers and long, cold winters characterize the continental subarctic climate of the area. The average annual precipitation ranges from 15 to 19 inches on valley bottoms and basins and from 19 to 26 inches at the higher elevations in the hills and mountains (PRISM 2018). Most of the precipitation falls as rain between May and September. The average annual snowfall ranges from 65 to 80 inches. The average

annual temperature is 22 to 24 degrees Fahrenheit (PRISM 2018). The temperature normally remains above freezing from mid-June through August in river valleys and basins with a freeze-free period ranging from 109 to 125 days. The free-free period is significantly shorter on higher elevation mountain slopes.

Vegetation

Most of this area is forested below an elevation of 1600 feet. Dominant tree species on slopes are white spruce and black spruce. Black spruce stands dominate on north-facing slopes, stream terraces, and other sites with poor drainage and permafrost. White spruce stands dominate on steep, south-facing slopes with dry soils. At lower elevations, lightning-caused wildfires are common, often burning many thousands of acres during a single fire event. Following wildfires, forbs, grasses, willow, ericaceous shrubs, paper birch, and quacking aspen communities are common until they are eventually replaced by stands of spruce. Tall willow and alder scrub is extensive on low flood plains. White spruce and balsam poplar are common on high flood plains.

With increasing elevation, the forests and woodlands give way to subalpine communities dominated by krummholz spruce, shrub birch, willow, and ericaceous shrubs. At even higher elevations, alpine communities prevail which are characterized by diverse forbs, dwarf ericaceous shrubs, and eightpetal mountain-avens. Many of these high elevation communities have a considerable amount of lichen cover and bare ground.

LRU notes

In this area, we refer to three life zones that are defined by the physiological limits of plant communities along an elevational gradient: boreal, subalpine, and alpine. The boreal life zone is the elevational band where forest communities dominate. Not all areas in the boreal life zone are forest communities, however, particularly in places with too wet or dry soil to support tree growth (e.g., bogs or river bluffs). Above the boreal band of elevation, subalpine and alpine vegetation dominate. The subalpine zone is a narrow transitional band between the boreal and the alpine life zones, and is characterized by sparse, stunted trees that can be considered tree line. In the subalpine, certain types of birch and willow shrub species grow at greater than or equal to 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. In this area, the boreal life zone occurs below 1600 feet elevation on average. The transition between boreal and subalpine vegetation can occur within a range of approximately 350 feet of elevation, and is highly dependent on slope, aspect, and shading from adjacent mountains.

Within each life zone, there are plant assemblages that are associated with cold slopes and warm 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 occur on southeast to west facing slopes that are moderate to very steep (greater than 10 percent slope) and are not shaded by the surrounding landscape.

Cold slopes 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. Warm boreal slope soils have a cryic soil temperature regime and lack permafrost. In this area, white spruce forests are an indicator of warm boreal slopes. Cold boreal slope soils have a gelic soil temperature regime and commonly have permafrost. In this area, black spruce forests and woodlands are an indicator of cold boreal slopes. The boreal life zone can occur at higher elevations on warm slopes, and lower elevations on cold slopes.

Classification relationships

Landfire BPS – 16101 – Western North American Boreal Mesic Scrub Birch-Willow Shrubland - Boreal

Ecological site concept

- Occurs in the subalpine on slopes and swales of mountains.
- Soils formed in loess and gravelly colluvium.
- Ponding and flooding do not occur.
- Soils are considered somewhat poorly drained.
- Soils range from shallow to deep based on depth to bedrock. Permafrost does not occur in the soil profile.
- The reference plant community is characterized as closed tall scrub (Viereck et al. 1992) with the dominant shrubs being tealeaf willow and scrub birch. Krummholz is common but white and black spruce has limited cover. Two plant communities occur within the reference state related to wildfire.

Associated sites

R233XY134AK	**Alpine Dwarf Scrub Gravelly Frozen Slopes** Occurs upslope on wet and gravelly soils in the alpine.
R233XY152AK	**High-elevation Scrub Gravelly Flood Plains** Occurs downslope in high elevation drainageways.
F233XY111AK	**Boreal Forest Loamy Frozen Slopes** Occurs downslope in the boreal life zone.
F233XY160AK	**Boreal Forest Gravelly Frozen Slopes** Occurs downslope in the boreal life zone.

Similar sites

R231XY148AK	**Subalpine Scrub Gravelly Slopes Moist** Occurs in an adjacent area (MLRA 231X) on similar soils and is provisionally thought to have similar vegetation and disturbance dynamics.

R233XY134AK	**Alpine Dwarf Scrub Gravelly Frozen Slopes** Ecological site 134 occurs in the alpine life zone. At times, scrub birch and willow can be dominant plants. However, in the alpine shrubs grow low or lay prostrate on the ground.
R233XY164AK	**Subalpine Scrub Gravelly Slopes** Ecological site 164 also occurs in the subalpine but with drier soils that support less willow and graminoid cover.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix pulchra* (2) *Betula glandulosa*
Herbaceous	(1) *Carex* (2) *Calamagrostis canadensis*

Physiographic features

- Occurs on the flanks and at the base of rounded mountains. Associated with mountain slopes and swales on mountain slopes. Swales are defined as shallow, open depressions that lack defined channels but can funnel overland or subsurface surface flow into a drainageway (Schoeneberger and Wysocki 2017).
- Associated with the subalpine life zone. Elevation is most commonly between 1600 and 2400 feet but can range to lower elevations on windswept positions like nose slopes.
- Slopes are moderately steep to steep and occur on all aspects.
- Ponding and flooding do not occur.
- These are moist soils with a seasonal water table occurring between 10 and 20 inches.
- Associated with low to moderate amounts of runoff to adjacent, downslope ecological sites.

Table 2. Representative physiographic features

Geomorphic position, mountains	(1) Mountainflank (2) Mountainbase
Hillslope profile	(1) Backslope (2) Footslope
Landforms	(1) Mountains > Mountain (2) Mountains > Swale
Runoff class	Low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	488–732 m

Slope	20–60%
Water table depth	25–51 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	152–823 m
Slope	Not specified
Water table depth	Not specified

Climatic features

This Subalpine Scrub Gravelly Moist Slopes ecological site is associated with a harsh climate especially when compared to ecological sites at lower elevations in the boreal life zone. In MLRA 233X, snow first blankets and persists the longest in the alpine and subalpine life zones. During the growing season (May through September), it is consistently 2 to 3 degrees Fahrenheit colder in the alpine and subalpine (PRISM 2018). These small differences in temperature are exacerbated due to constant and strong winds. Winds are much more intense in these high elevation areas because of limited trees providing windbreaks. When compared to the boreal life zone, this site has a much shorter growing season, and the growing season is significantly colder for associated vegetation.

Short, warm summers and long, cold winters characterize the subarctic continental climate associated with this alpine dwarf scrub gravelly slopes ecological site. The mean annual temperature for MLRA 233X ranges from 22 to 24 degrees Fahrenheit (PRISM 2008). The warmest months span May through August with mean normal maximum monthly temperatures ranging from 51 to 64 degrees Fahrenheit. The coldest months span December through March with mean normal minimum temperatures ranging from -2 to 3 degrees Fahrenheit. The freeze-free period for this subalpine ecological site ranges from 65 to 88 days, and the temperature generally remains above freezing from late May through early-September.

The area receives minimal annual precipitation with July through September being the wettest. Average annual precipitation across MLRA 233X ranges between 17 to 21 inches (PRISM 2008). Approximately half of the annual precipitation occurs during the months of July through September with thunderstorms common. The average annual snowfall ranges from 65 to 80 inches (USDA 2022). The ground is consistently covered with snow from November through March.

Table 4. Representative climatic features

Frost-free period (characteristic range)	48-69 days
Freeze-free period (characteristic range)	69-85 days
Precipitation total (characteristic range)	432-533 mm
Frost-free period (actual range)	17-73 days
Freeze-free period (actual range)	65-88 days
Precipitation total (actual range)	356-610 mm
Frost-free period (average)	60 days
Freeze-free period (average)	76 days
Precipitation total (average)	457 mm

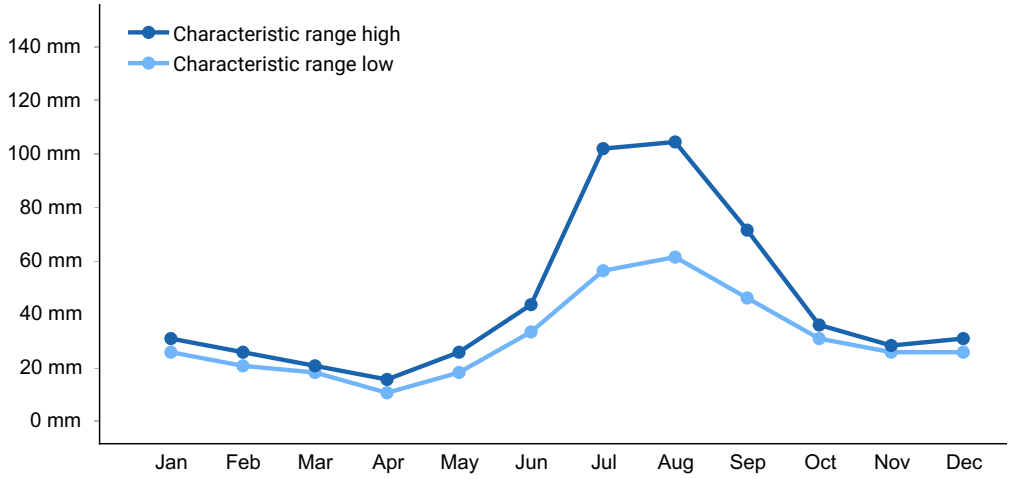


Figure 1. Monthly precipitation range

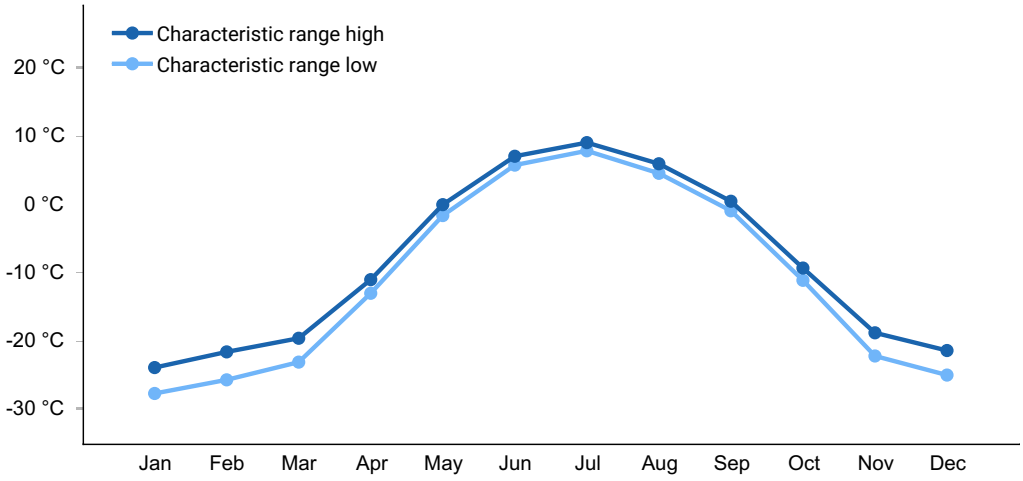


Figure 2. Monthly minimum temperature range

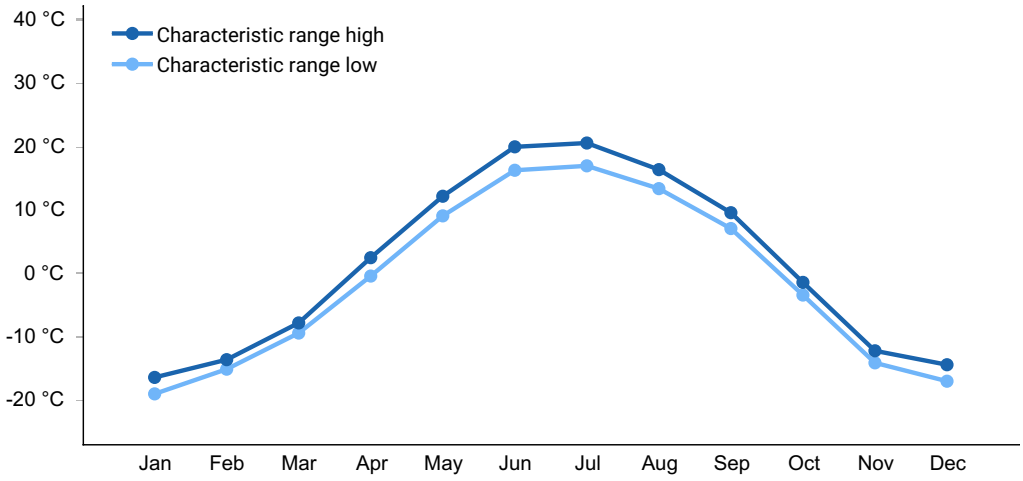


Figure 3. Monthly maximum temperature range

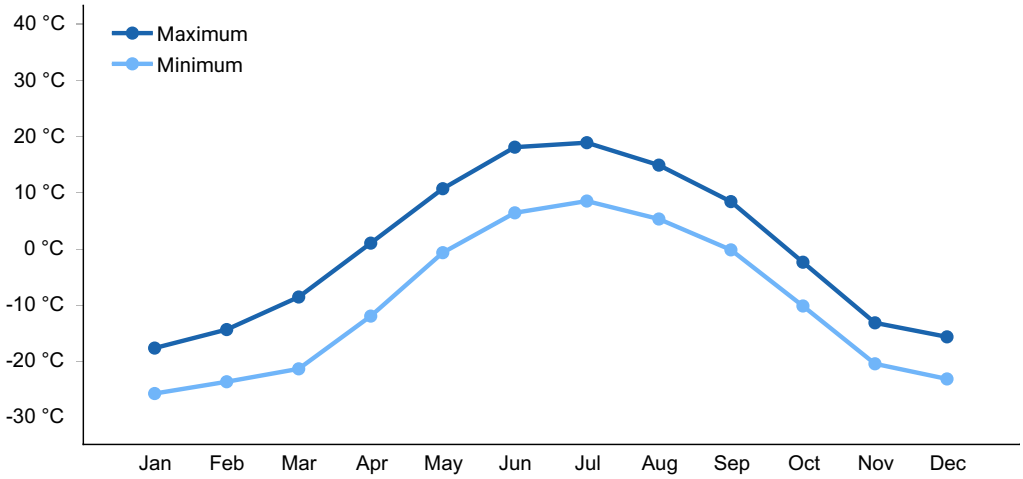


Figure 4. Monthly average minimum and maximum temperature

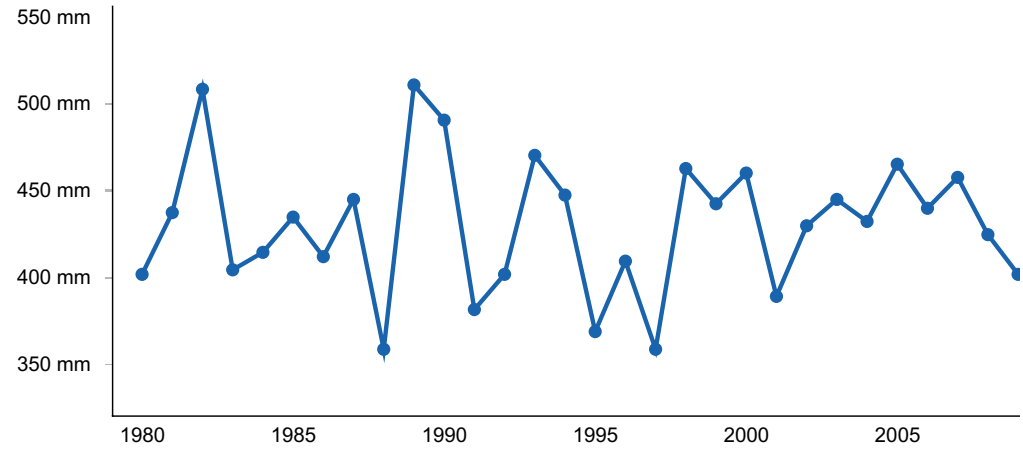


Figure 5. Annual precipitation pattern

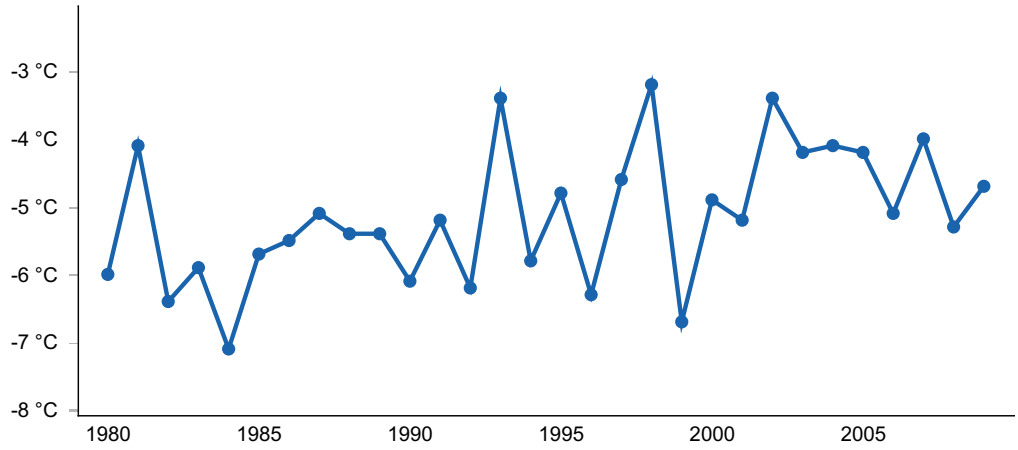


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BETTLES AP [USW00026533], Bettles Field, AK

Influencing water features

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

Wetland description

Not a wetland.

Soil features

- Soils formed in loess and gravelly colluvium.
- Rock fragments on the soil surface range between zero and 5 percent cover.
- Capped with up to two inches of organic material.
- The surface mineral horizons are mucky silt loams or channery silt loams with the silty material being derived from loess or silty colluvium. Where present, the silt loam surface horizon can be up to 10 inches thick.
- The mineral horizons above bedrock have rock fragments ranging between 0 and 25 percent of the soil profile by volume.
- Soils are shallow to deep with soil depth controlled by bedrock contact. Soils occasionally have strong contrasting textural stratification at very shallow to shallow depths (between 8 and 17 inches). This restriction can affect the movement and retention of water and/or nutrients.
- The pH of the soil profile ranges from very strongly acidic to slightly acidic.
- These are moist soils that are considered somewhat poorly drained.
- Soils are classified as Mollisols in the great group Haplogellolls or Inceptisols in the great

group Gelepts.

Table 5. Representative soil features

Parent material	(1) Loess (2) Colluvium–schist (3) Colluvium–igneous rock
Surface texture	(1) Mucky silt loam (2) Channery silt loam
Family particle size	(1) Loamy-skeletal
Drainage class	Somewhat poorly drained
Permeability class	Moderately rapid
Depth to restrictive layer	28–43 cm
Soil depth	28–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	5.84–11.43 cm
Calcium carbonate equivalent (25.4-101.6cm)	0%
Clay content (0-50.8cm)	5–15%
Electrical conductivity (25.4-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (25.4-101.6cm)	0
Soil reaction (1:1 water) (25.4-101.6cm)	4.9–6.2
Subsurface fragment volume <=3" (0-152.4cm)	0–16%
Subsurface fragment volume >3" (0-152.4cm)	0–9%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Depth to restrictive layer	20–152 cm
Soil depth	Not specified

Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	5.84–13.46 cm
Calcium carbonate equivalent (25.4-101.6cm)	Not specified
Clay content (0-50.8cm)	Not specified
Electrical conductivity (25.4-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (25.4-101.6cm)	0–3
Soil reaction (1:1 water) (25.4-101.6cm)	Not specified
Subsurface fragment volume <=3" (0-152.4cm)	Not specified
Subsurface fragment volume >3" (0-152.4cm)	Not specified

Ecological dynamics

Climate

This Subalpine Scrub Gravelly Moist Slopes ecological site is exposed to a variety of harsh environmental conditions. Compared to the boreal life zone, snowpack tends to be deeper and persist for longer durations of time. As a result, subalpine vegetation has a comparatively shorter season to grow and reproduce. When this site is snow-free, cold soil temperatures and high winds also inhibit plant growth and performance with krummholz white spruce being common. This harsh climate maintains vegetation within this site and prevents the establishment and/or growth of dominant boreal species like white spruce and black spruce.

The cover and density of white spruce and black spruce associated with this site is highly variable but is largely controlled by the harsh subalpine climate. This site occurs at elevations just above the boreal life zone. Given the nearby seed source and high winds, this site receives ample seed rain from forested stands of spruce. As a result, ocular cover of white and black spruce is highly variable. While trees may be present, their ability to produce viable seed is limited by the harsh high-elevation climate (Roland et al. 2013). The subalpine climate combined with a fire regime greatly limits forest potential for this site.

Fire

Within this area, wildfire is considered a natural and common event that typically goes unmanaged. Fire suppression is limited and occurs adjacent to the small villages spread throughout the area or on allotments with known structures, all of which have a relatively limited acre footprint. Most fires are caused by lightning strikes. From 2000 to 2020, 124 known fire events occurred in this area and the burn perimeter of the fires totaled approximately one million acres (AICC 2022). Fire-related disturbances are highly patchy and can leave undisturbed areas within the burn perimeter. During this time frame, 90 percent of the fire events were smaller than 20,000 acres but three fire events were greater than 100,000 acres in size (AICC 2022). Over this period of 20 years, these burn perimeters cover approximately 20 percent of this area.

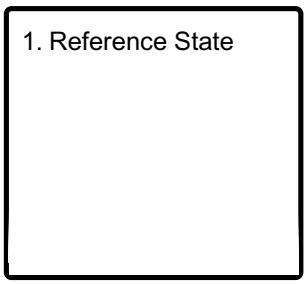
The fire regime within Interior Alaska follows two general scenarios—low-severity burns, and high-severity burns. It should be noted, however, that the fire regime in Interior Alaska can be considered more complex (Johnstone et al. 2008). Burn severity refers to the proportion of the vegetative canopy and organic material consumed in a fire event (Chapin et al. 2006). Fires in cool and moist habitat tend to result in low-severity burns, while fires in warm and dry habitat tend to result in high-severity burns. Because the soils have a thin organic cap and are somewhat poorly drained, the typical fire scenario for this ecological site is considered to result in a high severity burn.

Large portions of the organic mat are consumed during a high-severity fire event, commonly exposing pockets of mineral soil. The loss of this organic mat, which insulates the mineral soil, and the decrease in site albedo results in higher summertime temperatures and overall soil temperatures to increase (Hinzman et al. 2006). These alterations to soil temperature may result in increased depths to seasonally frozen soil where it persists into the growing season, better soil drainage earlier in the season, and dryer overall conditions. High-severity fire events also destroy a majority of the vascular and nonvascular biomass above ground.

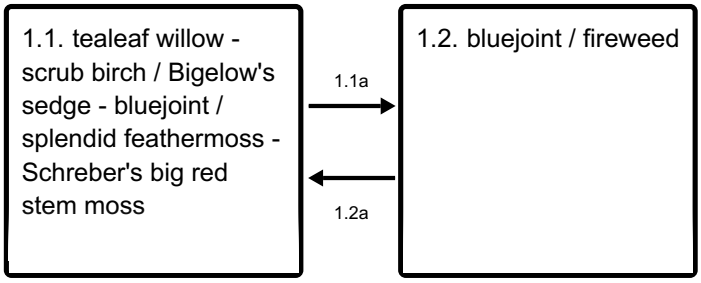
Data suggest that the scrub dominant community 1.1 burns and that fire events will cause a transition to the pioneering stage of fire succession. This stage (community 1.2) is a mix of species that either regenerate in place (e.g., subterranean root crowns for willow and rhizomes for graminoids) and/or from wind-dispersed seed or spores that colonize exposed mineral soil (e.g., quaking aspen [*Populus tremuloides*] and Ceratodon moss [*Ceratodon purpureus*]). The pioneering stage of fire succession is primarily composed of forbs, grasses, and weedy bryophytes. This stage of succession currently persists for an unknown amount of time but is thought to last 10 to 30 years post-fire. Scrub birch and ericaceous shrubs continue to colonize and grow in stature on recently burned sites until they become dominant in the overstory, which marks the transition to the reference plant community (community 1.1).

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - A high-severity fire sweeps through and incinerates much of the above ground vegetation.

1.2a - Time without fire. Data suggest post-fire recovery takes 10-30 years.

State 1
Reference State

The reference plant community is closed tall scrub (Viereck et al. 1992) with the dominant shrubs being scrub birch and willow. This site has no known associated disturbance regimes and has one plant community within the reference state. The vegetation modeled for this site has limited data and is considered provisional.

Dominant plant species

- tealeaf willow (*Salix pulchra*), shrub
- resin birch (*Betula glandulosa*), shrub
- Bigelow's sedge (*Carex bigelowii*), grass
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous

Community 1.1
tealeaf willow - scrub birch / Bigelow's sedge - bluejoint / splendid feathermoss - Schreber's big red stem moss

The reference plant community is characterized as closed tall scrub (Viereck et al. 1992), which is primarily composed of scrub birch (*Betula glandulosa*) and tealeaf willow. Scattered white spruce were occasionally present but trees are not a dominant overstory component. Other commonly observed species include bog blueberry, crowberry, lingonberry, Bigelow’s sedge, bluejoint, arctic raspberry, tall bluebells, boreal sagebrush,

arctic sweet coltsfoot, splendid feathermoss, and Schreber's big red stem moss. The vegetative strata that characterize this community are medium shrubs (between 3 and 10 feet) and moss. The soil surface is primarily covered with herbaceous litter and moss, but surface rock fragments are common (as much as 40 percent of plot).

Dominant plant species

- tealeaf willow (*Salix pulchra*), shrub
- resin birch (*Betula glandulosa*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- Bigelow's sedge (*Carex bigelowii*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- arctic raspberry (*Rubus arcticus*), other herbaceous
- tall bluebells (*Mertensia paniculata*), other herbaceous
- boreal sagebrush (*Artemisia arctica*), other herbaceous
- arctic sweet coltsfoot (*Petasites frigidus*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous

Community 1.2
bluejoint / fireweed

Community 1.2 is in the pioneering stage of fire-induced secondary succession for this ecological site. It is characterized as either a mesic forb herbaceous or mesic graminoid herbaceous community (Viereck et al. 1992). Although small areas of exposed bare soil are common, the soil surface is primarily covered with a mixture of weedy bryophyte species, woody debris, and herbaceous litter. Commonly observed species include various willow, fireweed, bluejoint, juniper polytrichum moss, and common liverwort (*Marchantia polymorpha*). The vegetative strata that characterize this community are medium forbs (between 4 and 24 inches), medium graminoids (between 4 and 24 inches), and mosses.

Dominant plant species

- tealeaf willow (*Salix pulchra*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- sedge (*Carex*), grass
- fireweed (*Chamerion angustifolium*), other herbaceous
- juniper polytrichum moss (*Polytrichum juniperinum*), other herbaceous
- ceratodon moss (*Ceratodon purpureus*), other herbaceous
- pohlia moss (*Pohlia nutans*), other herbaceous
- (*Marchantia polymorpha*), other herbaceous

Pathway 1.1a

Community 1.1 to 1.2

A fire sweeps through and incinerates much of the above ground vegetation. Because of the associated dry soils, this site commonly experiences high-severity fires. A significant proportion of organic matter is consumed, leaving exposed mineral soil. Vegetation usually resprouts from surviving individuals or is recruited from nearby areas via seed or seedbank.

Pathway 1.2a
Community 1.2 to 1.1

Time without fire. Grass and forb cover decreases, while scrub birch and ericaceous shrub cover increases. This community pathway is thought to take between 10 to 30 years.

Additional community tables

Animal community

not available

Hydrological functions

not available

Recreational uses

not available

Wood products

not available

Other products

not available

Other information

not available

Inventory data references

The vegetation modeled for this site has limited data and is considered provisional. The associated model was largely developed from NRCS staff with working knowledge of the area and literature review.

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Contributors

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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	03/21/2026
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):**

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:**
