USDA Natural Resources Conservation Service

Ecological site R233XY101AK
Alpine Dwarf Scrub Gravelly 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 – 7416310 – Western North American Boreal Alpine Dwarf-Shrub Summit (Landfire 2009)

Ecological site concept

- Occurs in the alpine on the summits and flanks of mountains.
- Soils formed in gravelly colluvium.
- Ponding and flooding do not occur.
- Soils range from moderately deep to very deep based on depth to bedrock. Permafrost does not occur in the soil profile.
- Soils are considered well drained.
- The reference plant community is dwarf scrub (Viereck et al. 1992) with common shrubs including eight-petal mountain-avens, arctic willow, and alpine bearberry. Multiple plant communities occur within the reference state related to wildfire and snowpack.

Associated sites

R233XY115AK	**Alpine Sedge Silty Frozen Slopes** Occurs in the alpine but on wet, loamy, and frozen soils.
R233XY134AK	**Alpine Dwarf Scrub Gravelly Frozen Slopes** Occurs in the alpine but on wet, gravelly, and frozen soils
R233XY152AK	**High-elevation Scrub Gravelly Flood Plains** Occurs downslope in high elevation drainageways.
R233XY164AK	**Subalpine Scrub Gravelly Slopes** Occurs downslope on warm subalpine slopes.

Similar sites

R231XY101AK	**Alpine dwarf scrub gravelly slopes** 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** Both sites support dwarf shrub communities. Site 134 has wet and frozen soils with different kinds and amounts of vegetation.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Dryas octopetala ssp. octopetala* (2) *Salix arctica*
Herbaceous	(1) *Flavocetraria cucullata* (2) *Alectoria ochroleuca*

Physiographic features

- Occurs on the tops and flanks of rounded and rugged mountains.
- Associated with the alpine life zone. Elevation is most commonly between 1600 and 2750 feet but can range to lower elevations on windswept positions like nose slopes.
- Slopes are moderately steep to very steep and occur on all slope aspects.
- Ponding and flooding do not occur.
- These moist soils have a seasonal water table between 40 and 60 inches.
- Associated with moderate amounts of runoff to adjacent, downslope ecological sites.

Table 2. Representative physiographic features

Geomorphic position, mountains	(1) Mountaintop (2) Mountainflank
Landforms	(1) Mountains > Mountain (2) Mountains > Mountain
Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	488–838 m
Slope	25–70%
Water table depth	102–152 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	152–838 m
Slope	12–70%
Water table depth	Not specified

Climatic features

This Alpine Dwarf Scrub Gravelly 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 boreal forest 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 alpine 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 seasonal thunderstorms. 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

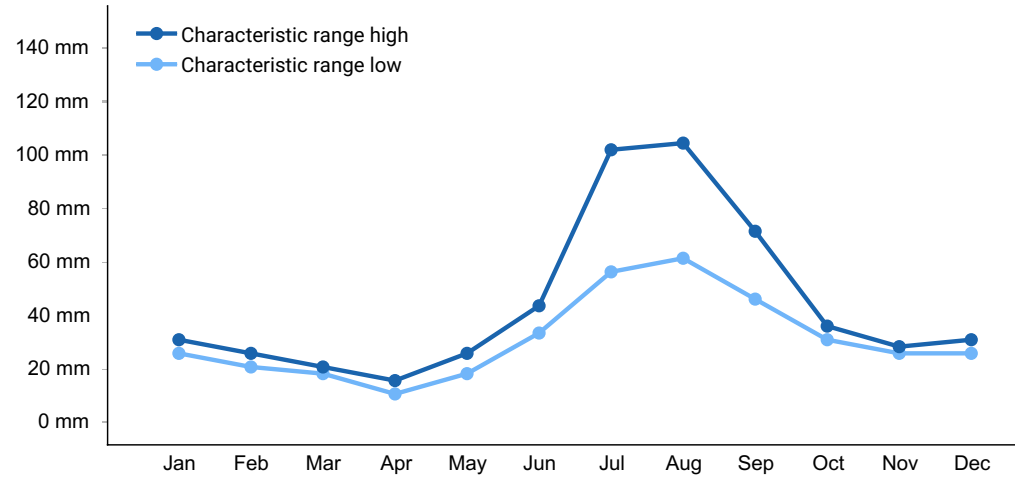


Figure 1. Monthly precipitation range

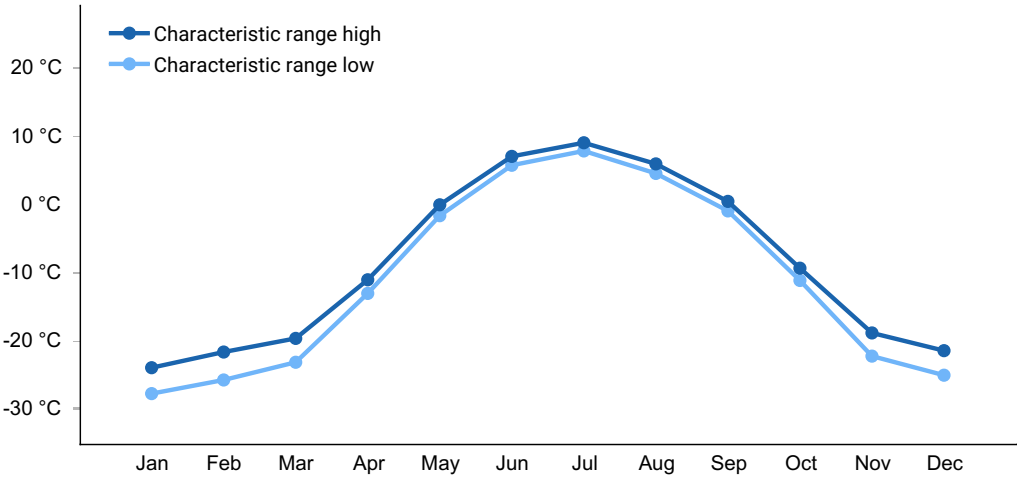


Figure 2. Monthly minimum temperature range

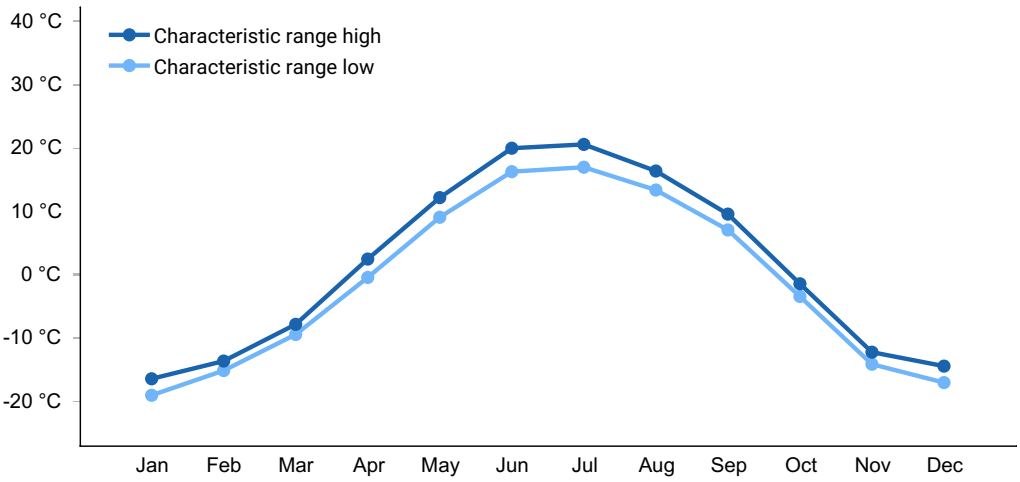


Figure 3. Monthly maximum temperature range

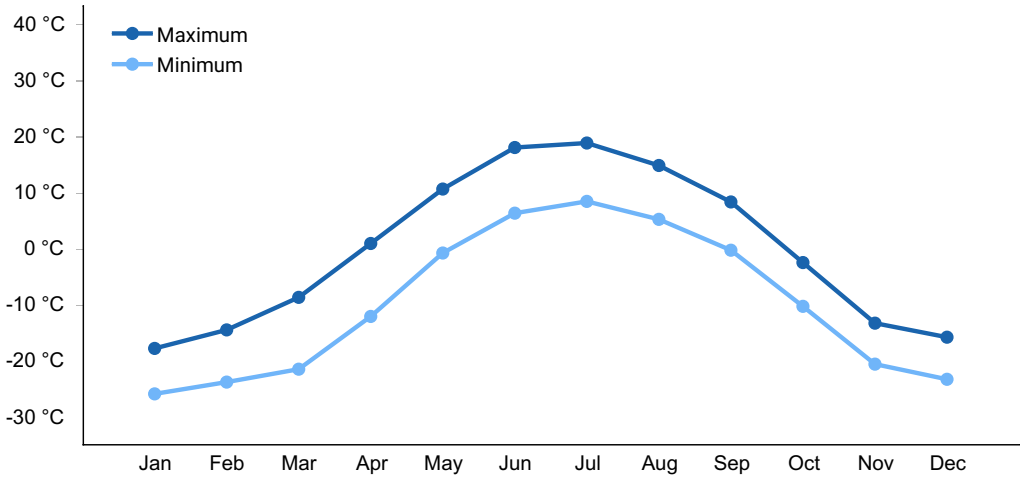


Figure 4. Monthly average minimum and maximum temperature

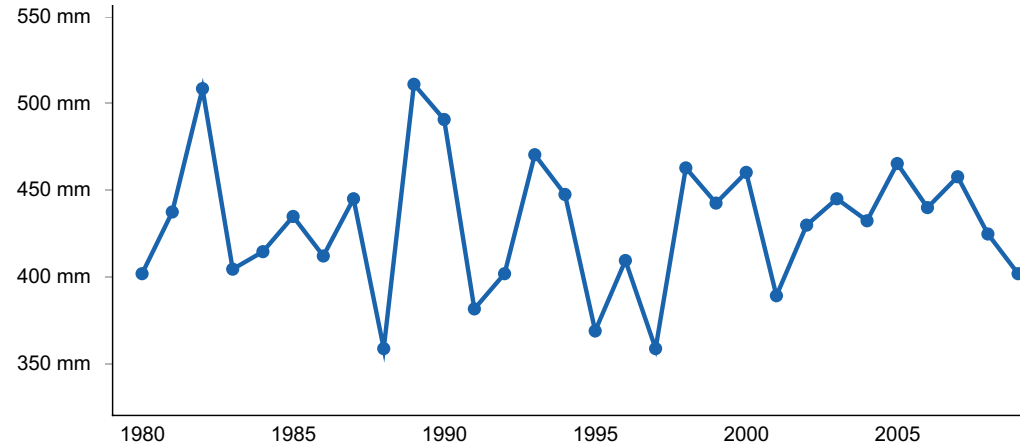


Figure 5. Annual precipitation pattern

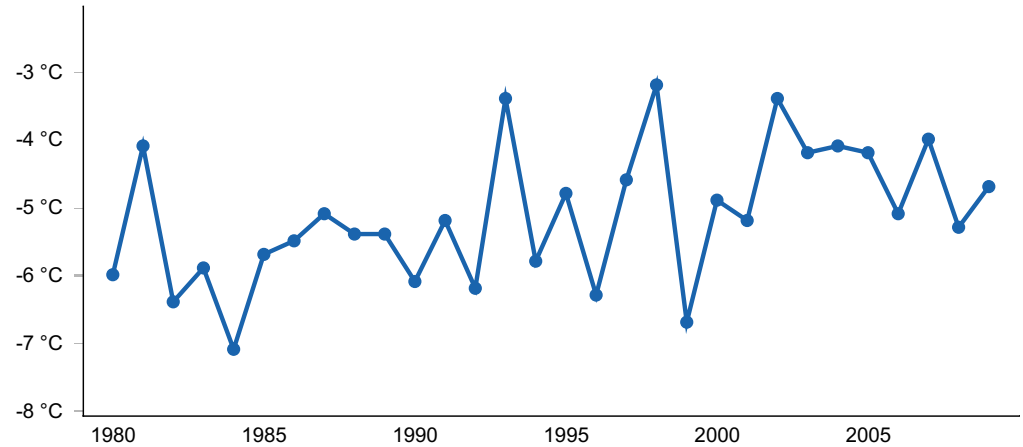


Figure 6. Annual average temperature pattern

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 2 and 60 percent cover.
- Capped with up to one inch of organic material.
- The surface mineral horizons are silt loams or channery silt loams with the silty material being derived from loess. Where present, the silt loam surface layer is thin.
- These gravelly soils have subsurface rock fragments ranging between 40 and 80 percent of the soil profile by volume.
- Soils are moderately deep to very deep, with soil depth controlled by bedrock contact. Soils often have strong contrasting textural stratification at very shallow depth (between two and six 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 moist soils are considered well drained.
- Soils are classified as Inceptisols in the great group Gelepts.

Table 5. Representative soil features

Parent material	(1) Loess (2) Colluvium–schist (3) Colluvium–igneous rock (4) Colluvium–sedimentary rock (5) Colluvium–volcanic rock
Surface texture	(1) Silt loam (2) Channery silt loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderately rapid
Depth to restrictive layer	5–89 cm
Soil depth	89–178 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	2–25%

Available water capacity (0-101.6cm)	3.3–8.38 cm
Calcium carbonate equivalent (25.4-101.6cm)	0%
Clay content (0-50.8cm)	10–15%
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)	4.6–6.2
Subsurface fragment volume <=3" (0-152.4cm)	30–45%
Subsurface fragment volume >3" (0-152.4cm)	10–35%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Depth to restrictive layer	Not specified
Soil depth	Not specified
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	2–60%
Available water capacity (0-101.6cm)	Not specified
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)	30–60%

Subsurface fragment volume >3" (0-152.4cm)	3–35%

Ecological dynamics

Climate

This Alpine Dwarf Scrub Gravelly Slopes ecological site is exposed to a variety of harsh environmental conditions. In the Upper Kobuk and Koyukuk Hills and Valleys MLRA (herein called area), snowfall first appears and persists the longest in the alpine. As a result, snowpack tends to be deeper and persist for longer durations of time compared to lower-elevation sites and alpine vegetation has a comparatively shorter growing season. When this ecological site is snow-free, cold soil temperatures and high winds also inhibit plant growth and vigor. This harsh climate maintains the dwarfed vegetation within this site and prevents the establishment and/or growth of dominant boreal species like white spruce and black spruce.

Snow beds

Plant community 1.2 occurs in sheltered positions that have atypically deep snowpack. These sheltered positions are small, occur adjacent to plant community 1.1, and commonly occur on the leeward side of rock outcrops and/or sharp ridges or on steep northing facing slopes. These sheltered positions are thought to have snowpack that persisted for longer durations of time compared to the more wide-spread plant community 1.1. This persistent snowpack leads to plant community 1.2 having moister soils wither greater amounts of ericaceous scrubs like white arctic mountain heather (*Cassiope tetragona*).

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 well 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.

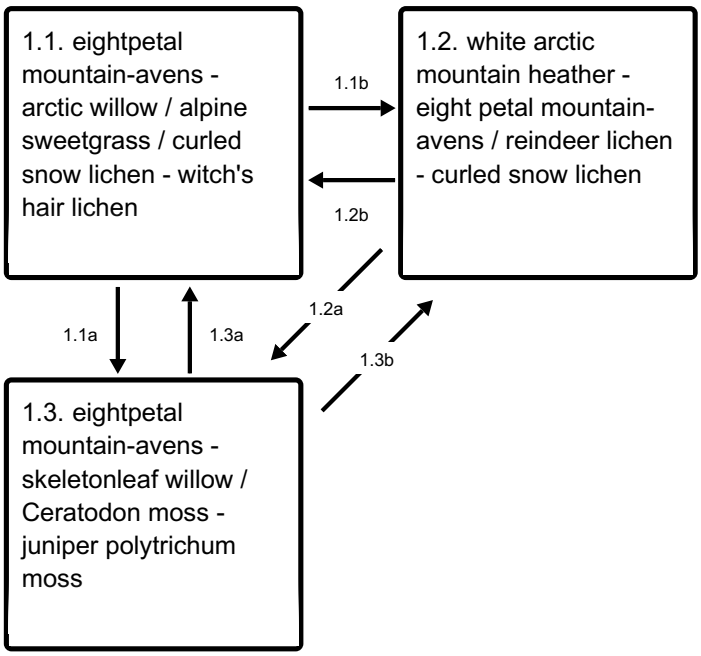
Data suggest that the scrub dominant plant community 1.1 burns and that fire events will cause a transition to the pioneering stage of fire succession. This stage (community 1.3) is a mix of species that either regenerate in place (e.g., subterranean root crowns for willow and rhizomes for graminoids) and/or from wind-dispersed seed or spores that colonize exposed mineral soil (e.g., fireweed [*Chamerion angustifolium*] and Ceratodon moss [*Ceratodon purpureus*]). The pioneering stage of fire succession is primarily composed of dwarf scrubs, grasses, 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. Eightpetal mountain-avens and other dwarf shrubs and lichen continue to colonize and grow until they become dominant in the plant community, which marks the transition to the reference plant community (community 1.1).

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities



1.1b - Increased annual snowpack that persists for longer durations of time

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

1.2b - Decreased annual snowpack that persists for shorter durations of time

1.2a - A high-severity fire sweeps through and incinerates much of the above ground vegetation.

1.3a - Time without fire

1.3b - Time without fire

State 1
Reference State

The reference plant community (community 1.1) is dryas dwarf scrub (Viereck et al. 1992). There are three plant communities in the reference state related to either snowpack or fire. Community 1.2 occurs in sheltered positions that have atypically deep snowpack. These sheltered positions are small in size, occur in close proximity to community 1.1, and commonly occur on the leeward side of rock outcrops and/or sharp ridges or on steep northing facing slopes. These sheltered positions are thought to have snowpack that persists for longer durations of time compared to the more wide-spread community 1.1. This persistent snowpack leads to community 1.2 having slightly moister soils. Both of these communities have the potential to burn resulting in community 1.3. Cryoturbation is process associated with this state that results in the formation of non-sorted circles, sorted circles, and sorted stripes. Cryoturbation is a collective term used to describe all soil movements due to frost action, characterized by folded, broken and dislocated beds and lenses of unconsolidated deposits (Schoeneberger and Wysocki 2017). Since non-sorted circles are uncommon for this site and data did not support these features having a vegetation mosaic, no alternative state was developed for this site (see R233XY134AK for a site that does have this alternate state). No alternative state or plant communities were developed for sorted circles and stripes as they are primarily barren rock.

Dominant plant species

- eightpetal mountain-avens (*Dryas octopetala ssp. octopetala*), shrub
- arctic willow (*Salix arctica*), shrub
- alpine sweetgrass (*Anthoxanthum monticola ssp. alpinum*), grass
- (*Flavocetraria cucullata*), other herbaceous
- witch's hair lichen (*Alectoria ochroleuca*), other herbaceous

Community 1.1
eightpetal mountain-avens - arctic willow / alpine sweetgrass / curled snow lichen - witch's hair lichen

The reference plant community is characterized as dryas dwarf scrub (Viereck et al. 1992). Stunted white spruce occasionally occur but have limited cover. Common species include eight-petal mountain-avens, Alaskan mountain-avens, arctic willow, skeletonleaf willow, alpine bearberry, alpine azalea, lingonberry, alpine sweetgrass, Bigelow's sedge, smallawned sedge, curled snow lichen (*Flavocetraria cucullata*), witch's hair lichen, and Bryocaulon lichen. The vegetative strata that characterize this community are dwarf shrubs (less than 8 inches) and foliose and fruticose lichen. The soil surface is primarily covered with herbaceous litter, surface rock fragments, and lichen.

Forest understory. The mountain-avens most commonly associated with this site is Dryas alaskensis (DROCA2) and Dryas ajanensis (DROCO). The Flora of North America no longer recognizes eightpetal mountain-avens (Dryas octopetala) as occurring in Alaska and has split this species concept into several new species (Springer and Parfitt 2015).

Dominant plant species

- eightpetal mountain-avens (*Dryas octopetala ssp. octopetala*), shrub
- skeletonleaf willow (*Salix phlebophylla*), shrub
- arctic willow (*Salix arctica*), shrub
- alpine bearberry (*Arctostaphylos alpina*), shrub
- alpine azalea (*Loiseleuria procumbens*), shrub
- Alaskan mountain-avens (*Dryas octopetala ssp. alaskensis*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- pincushion plant (*Diapensia lapponica var. obovata*), shrub
- alpine sweetgrass (*Anthoxanthum monticola ssp. alpinum*), grass
- Bigelow's sedge (*Carex bigelowii*), grass
- smallawned sedge (*Carex microchaeta*), grass
- (*Flavocetraria cucullata*), other herbaceous
- witch's hair lichen (*Alectoria ochroleuca*), other herbaceous
- bryocaulon lichen (*Bryocaulon divergens*), other herbaceous

Community 1.2
white arctic mountain heather - eight petal mountain-avens / reindeer

lichen - curled snow lichen

Community 1.2 is characterized as ericaceous dwarf scrub (Viereck et al. 1992). Common species include white arctic mountain heather, eight-petal mountain-avens, alpine azalea, crowberry, marsh Labrador tea, bog blueberry, lingonberry, various reindeer lichen, and curled snow lichen. The vegetative strata that characterize this community are dwarf shrubs (less than 8 inches) and foliose and fruticose lichen. The soil surface is primarily covered with herbaceous litter, surface rock fragments, and lichens.

Dominant plant species

- white arctic mountain heather (*Cassiope tetragona*), shrub
- eightpetal mountain-avens (*Dryas octopetala ssp. octopetala*), shrub
- alpine azalea (*Loiseleuria procumbens*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- greygreen reindeer lichen (*Cladina rangiferina*), other herbaceous
- (*Flavocetraria cucullata*), other herbaceous
- star reindeer lichen (*Cladina stellaris*), other herbaceous

Community 1.3
eightpetal mountain-avens - skeletonleaf willow / Ceratodon moss - juniper polytrichum moss

Community 1.3 is in the pioneering stage of fire-induced secondary succession for this ecological site. Community 1.3. is characterized as dryas dwarf scrub (Viereck et al. 1992). Commonly observed species include eightpetal mountain-avens, arctic willow, skeletonleaf willow, Altai fescue, bluegrass, fireweed, Ceratodon moss, and juniper Polytrichum moss. The vegetative strata that characterize this community are dwarf shrubs (less than 8 inches) and moss. The soil surface is primarily covered with a mixture of herbaceous litter, weedy bryophyte species, and surface rock fragments.

Dominant plant species

- eightpetal mountain-avens (*Dryas octopetala ssp. octopetala*), shrub
- skeletonleaf willow (*Salix phlebophylla*), shrub
- arctic willow (*Salix arctica*), shrub
- Altai fescue (*Festuca altaica*), grass
- bluegrass (*Poa*), grass
- ceratodon moss (*Ceratodon purpureus*), other herbaceous
- juniper polytrichum moss (*Polytrichum juniperinum*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous

Pathway 1.1b

Community 1.1 to 1.2

Multiple growing seasons with atypically deep snowpack. This snowpack persists for longer duration of time and result in slightly moister soils during the growing season. Vegetation shifts from dryas dwarf scrub to ericaceous dwarf scrub.

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 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 1.2b
Community 1.2 to 1.1

Protected positions no longer receive atypically deep snowpack. This results in slightly drier soils during the growing season. Vegetation shifts from ericaceous dwarf scrub to Dryas dwarf scrub.

Pathway 1.2a
Community 1.2 to 1.3

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 1.3a
Community 1.3 to 1.1

Time without fire results in decreases to graminoid and weedy moss cover and increases to shrub and lichen cover.

Pathway 1.3b
Community 1.3 to 1.2

Time without fire results in decreases to graminoid and weedy moss cover and increases to shrub and lichen cover.

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	03/20/2026
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):

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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:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**
