USDA Natural Resources
Conservation Service

Ecological site F234XY714AK
Boreal forest 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): 234X–Interior Brooks Range Mountains

Geography
The Interior Brooks Range mountains area consists of predominantly steep, jagged mountains and narrow valleys that drain the southern side of the Brooks Range. This area is bordered by the Northern Brooks Range Mountains (Major Land Resource Area (MLRA) 244) to the north, the Western Brooks Range Mountains Foothills and Valleys (MLRA 243) to the west, and the Upper Kobuk and Koyukuk Hills and Valleys (MLRA 233) and the Interior Alaska Highlands (MLRA 231) to the south. The Brooks Range represents a drainage divide that is also the dividing line between MLRA 234 and MLRA 244. Rivers draining to the north wind their way along the North Slope until they reach the Arctic Ocean, while rivers that drain to the south reach the northern Pacific Ocean via the Bering Sea. MLRA 234 covers an area of 22,479 miles and is sparsely populated (USDA, 2022).

Geology
The Brooks Range is the northernmost extension of the Rocky Mountains and the highest range within the Arctic Circle, with high peaks in the eastern part of the range reaching elevations of nearly 9,000 feet. This area falls within the zone of discontinuous permafrost, with the continuous permafrost zone primarily occurring north of the Brooks Range. Wide, U-shaped valleys are evidence of extensive glaciation in the Early and Mid-Pleistocene, with most glaciers retreating to their current, high-elevation positions by the Late Pleistocene. The characteristically sharp upper peaks give way to lower mountain slopes comprised of alluvial and colluvial fans before reaching the gently sloping flood plains and terraces of the valley bottoms. While Paleozoic and Jurassic igneous and volcanic rocks can be found in the eastern part of the range, most of the lower slopes of this area are comprised of modified glacial material, alluvial, and colluvial deposits. Many rivers and

streams, such as the Koyukuk, have their headwaters in the Brooks Range and drain to the Bering Sea and North Pacific Ocean via the Yukon River.

Soils
The dominant soils orders in this MLRA are Gelisols, Entisols, and Inceptisols. Soils in the area have a gelic (subgelic) or cryic temperature regime, a udic or aquic moisture regime, and mixed minerology. Gelisols are common on soils that are shallow or moderately deep to permafrost and are somewhat poorly to very poorly drained. Gelisols are more common on cold slopes and stream terraces. In some cases, higher-intensity wildfires lead to loss of insulation when the surface organic layer is burned. This can lead to permafrost loss or active layer expansion and ultimately alter hydrology and taxonomic classification. Entisols and Inceptisols lacking in permafrost range from excessively-well to poorly drained. Entisols and Inceptisols are more common on rocky terrain, warm boreal slopes, and flood plains. Miscellaneous areas such as glaciers, riverwash, rock outcrop, and rubble land make up 63 percent of the MLRA.

Vegetation
The continental subarctic climate of the Brooks Range in conjunction with shallow, rocky soils leads to a sparsely forested landscape in this MLRA. Spruce-hardwood forests and woodlands tend to be relegated to lower elevations where deeper soils form on foot slopes and terraces. This is contrasted by the ericaceous dwarf shrub communities that are abundant on shallow, rocky slopes and ridges. Exposed sites are predominantly covered in lichen and sporadic forbs. Black spruce (Picea mariana) woodlands and tussock-forming sedge communities are on high stream terraces and foot slopes where permafrost occurs, as are wet sedge meadows. Floodplains tend to be dominated by low to tall willow scrub communities.

Land use
Except for areas along the Dalton Highway, access to most of this MLRA is extremely limited, lending itself to intact natural vegetation communities. For this reason, land use primarily takes the form of subsistence hunting, gathering, and fishing by local communities. In additions to subsistence activity, the Brooks Range is also a popular recreation destination, with many users utilizing air taxi and guiding services to access remote parts of the area. As is the case with much of interior Alaska, major resource concerns involve the persistence of permafrost, the degradation of which can lead to various changes in hydrology and nutrient cycling.

LRU notes

This area supports three life zones 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 where soil is too wet or dry 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 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 taller than 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 2,500 feet elevation on average. 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 (greater than ten 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. Warm boreal slope soils have a cryic soil temperature regime and lack permafrost. In this area, white spruce (*Picea glauca*) forests are an indicator of warm boreal slopes. Cold boreal slope soils typically 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

Alaska Vegetation Classification
Open white spruce needleleaf forest (I.A.2.e. – level IV)
(Viereck et al. 1992)

LANDFIRE Biophysical Settings
7416030 – Western North American Boreal White Spruce-Hardwood Forest
(LANDFIRE biophysical settings, 2009)

Ecological site concept

Key soils and site characteristics
• Occurs in the boreal life zone typically below 2,310 feet
• Warm slopes (southeast to west facing)
• Moderate slopes (14 to 45 percent)
• Loamy-skeletal, well-drained soils without permafrost

Associated sites

F234XY713AK	**Boreal forest loamy frozen slopes** Occurs downslope on cold and frozen footslopes and toeslopes with stands of black spruce (Picea mariana).

Similar sites

F234XY711AK	**Boreal forest gravelly steep slopes** Both ecological sites occur on the same warm boreal slopes. The steeper slopes associated with F234XY711AK have comparatively warmer soils that result in more productive white spruce (Picea glauca) stands.

Table 1. Dominant plant species

Tree	(1) *Picea glauca*
Shrub	(1) *Rosa acicularis* (2) *Vaccinium vitis-idaea*
Herbaceous	(1) *Hylocomium splendens* (2) *Pleurozium schreberi*

Physiographic features

This ecological site occurs on warm, moderate slopes, plains, and hills in the southern Brooks Range. Elevations range between 890 and 2310 feet above sea level. Slopes range from 14 to 45 percent and ponding and flooding are not known to occur.

Table 2. Representative physiographic features

Geomorphic position, mountains	(1) Lower third of mountainflank
Landforms	(1) Mountains > Mountain slope (2) Mountains > Hillslope (3) Plains > Plain
Runoff class	Low
Flooding frequency	None
Ponding frequency	None
Elevation	271–704 m
Slope	14–45%
Aspect	W, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified

Ponding frequency	Not specified
Elevation	271–1,564 m
Slope	Not specified

Climatic features

Characterized by a continental subarctic climate, cool, short summers interspace long, cool winters in this Major Land Resource Area (MLRA). Average annual temperatures range from 8 to 16 degrees, with freezing temperatures possible throughout the year. Precipitation ranges from 10 inches at low elevations up to 30 inches in the high elevations, with average snowfall ranging from 60 to 100 inches, annually. On average, there are only four frost free days per year at lower elevations, with frost possible throughout the year at higher elevations. The average high temperature in July (the warmest month, on average) is 65 degrees F, while the average high temperature in January is -1 degrees F. Extreme lows are common throughout interior Alaska. The lowest temperature recorded in Bettles Field, the location of one of the weather stations below, reached -69 degrees F.

Table 4. Representative climatic features

Frost-free period (characteristic range)	3-4 days
Freeze-free period (characteristic range)	48-59 days
Precipitation total (characteristic range)	254-356 mm
Frost-free period (actual range)	3-4 days
Freeze-free period (actual range)	46-61 days
Precipitation total (actual range)	229-356 mm
Frost-free period (average)	4 days
Freeze-free period (average)	54 days
Precipitation total (average)	305 mm

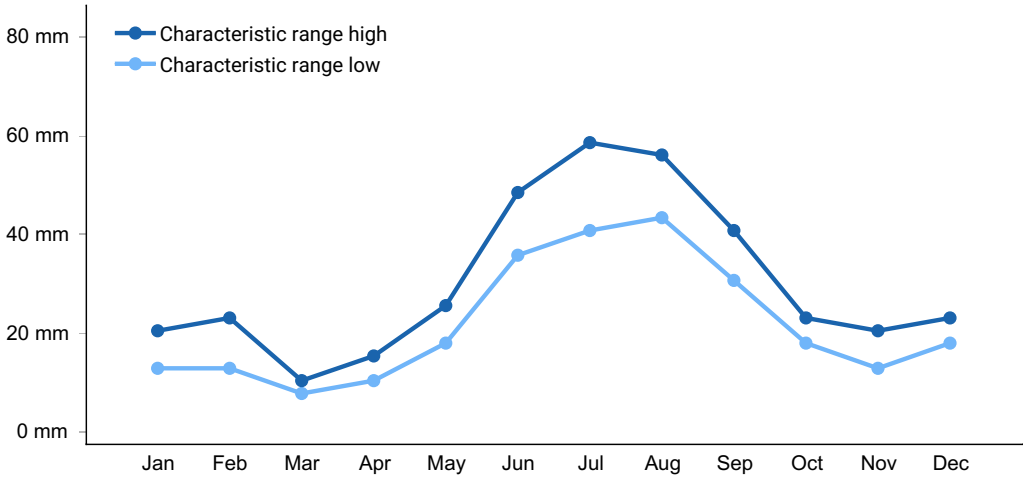


Figure 1. Monthly precipitation range

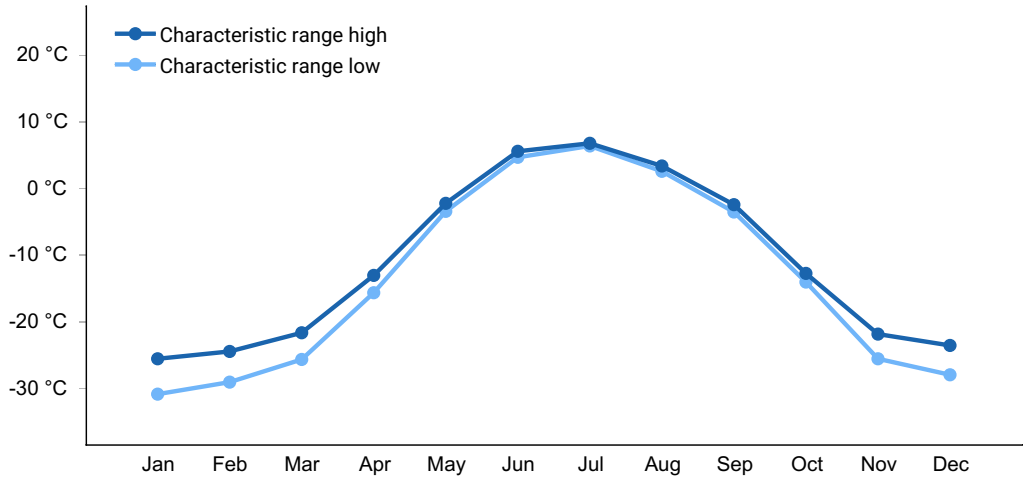


Figure 2. Monthly minimum temperature range

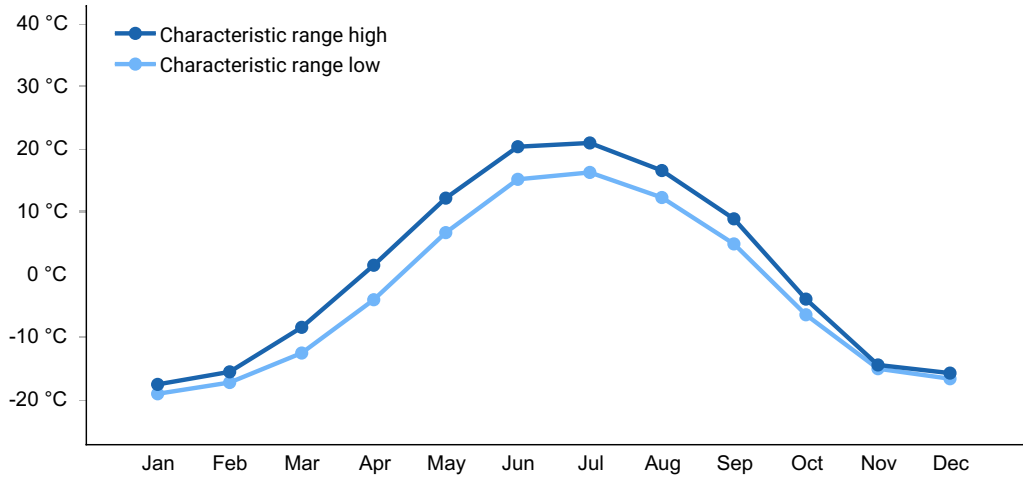


Figure 3. Monthly maximum temperature range

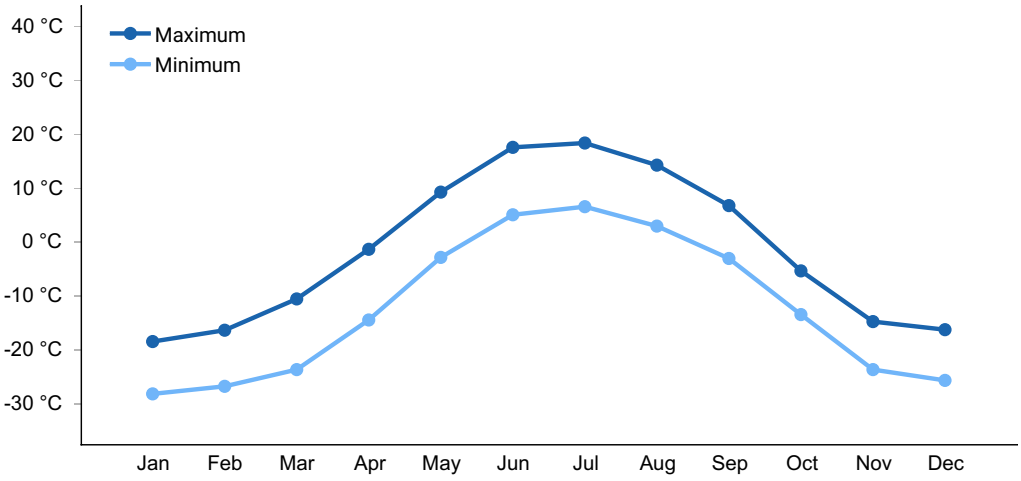


Figure 4. Monthly average minimum and maximum temperature

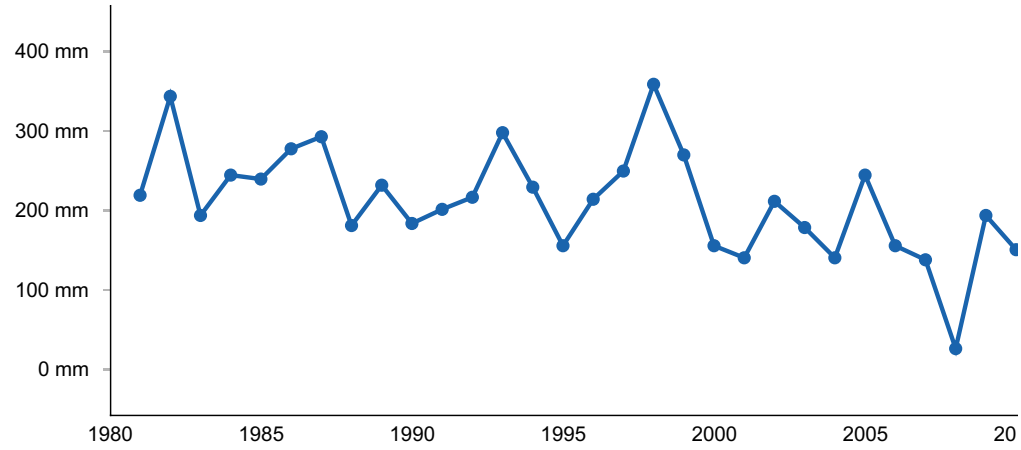


Figure 5. Annual precipitation pattern

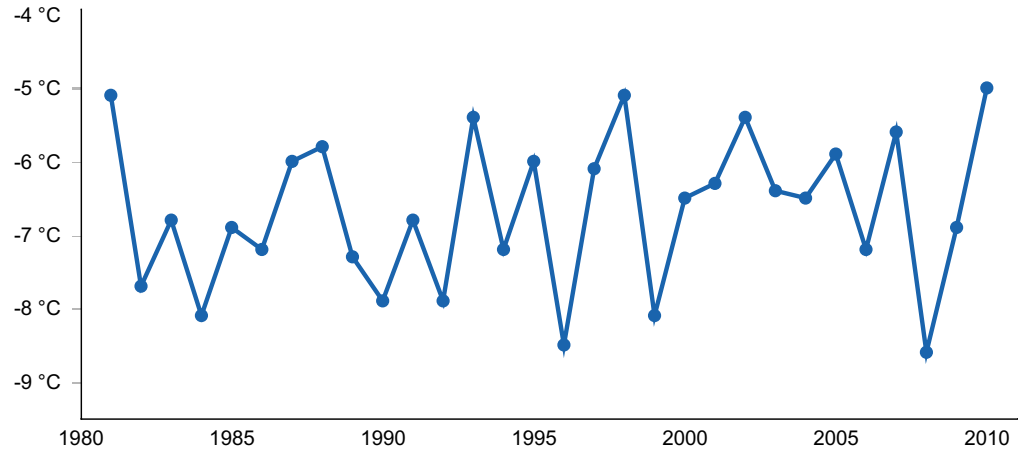


Figure 6. Annual average temperature pattern

Climate stations used

- (1) WISEMAN [USC00509869], Bettles Field, AK
- (2) CHANDALAR SHELF DOT [USC00501497], Southerly North Slope Bo, AK
- (3) CHANDALAR LAKE [USC00501492], Yukon Flats Nat Wildlife, AK

Influencing water features

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

Soil features

The soils of this ecological site are formed in windblown silts over gravelly glacial till and do not have permafrost. Surface rock fragments are not common, but below the surface, rock fragments occur in higher concentrations ranging from 5 to 45 percent. Loamy-skeletal mineral soils are typically capped with three inches of organic material. Soils are considered very deep but have a restrictive layer in the form of a strongly contrasting textural stratification occurring between two and six inches of the soil surface. The soils of this site are extremely acidic to very strongly acidic. No water table persists within the soil profile and soils are considered well-drained.

Table 5. Representative soil features

Parent material	(1) Loess (2) Till
Surface texture	(1) Silt loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Very rapid
Depth to restrictive layer	5–15 cm
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–1%
Available water capacity (0-101.6cm)	3.81–11.18 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (25.4-101.6cm)	4.3–4.8

Subsurface fragment volume <=3" (0-152.4cm)	21–45%
Subsurface fragment volume >3" (0-152.4cm)	5–13%

Ecological dynamics

In interior Alaska, fire is a common and natural event that has a significant control on the vegetation dynamics across the landscape. A typical fire event in the lands associated with this ecological site will reset plant succession and alter dynamic soil properties (e.g., thickness of the organic material). For this ecological site to progress from the earliest stages of post-fire succession dominated by grasses and forbs to the oldest stages of succession dominated by white spruce forests, data suggest that 150 years or more must elapse without another fire event (Foot1982; Chapin et al. 2006; Landfire 2009).

Within this area, fire is considered a natural and common event that typically is unmanaged. Fire suppression is limited and generally occurs adjacent to the various 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.

The fire regime within Interior Alaska follows two basic scenarios—low-severity burns, and high-severity burns. It should be noted, however, that the fire regime in interior Alaska is generally thought to be much 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 tends to cause overall soil temperatures to increase (Hinzman et al. 2006). These alterations to soil temperature may result in increased depths of seasonal frost in the soil profile. High-severity fire events also destroy a majority of the vascular and nonvascular biomass above ground.

Literature and field data from similar sites suggest that each of the forested community phases will burn and that fire events will cause a transition to the pioneering stage of fire succession. This pioneering stage (community phase 1.5) 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 tree seedlings, forbs, grasses, and weedy bryophytes. This stage of succession is thought to persist for up to ten years post-fire. Willow (Salix spp.) and quick growing deciduous tree seedlings

continue to colonize and grow in stature on recently burned sites until they become dominant in the overstory, which marks the transition to the early stage of fire succession (community phase 1.4). This early stage of fire succession is thought to persist 10 to 30 years post-fire. In the absence of fire, tree species continue to become more dominant in the stand and eventually develop into forests.

The latter stages of succession have an overstory that is dominantly deciduous trees (community phase 1.3), a mix of broadleaf and needleleaf trees (community phase 1.2), or needleleaf trees (community phase 1.1). The recruitment of trees species during the pioneering and early stages of post-fire succession largely controls the composition of the stand of trees in the later stages of post-fire succession (Johnstone et al. 2010a). During these later stages of succession, the slower growing white spruce (*Picea glauca*) seedlings mature and eventually replace the shade-intolerant broadleaf tree species. The typical fire return interval for white spruce stands in Interior Alaska is 150 years (Landfire 2009; Abrahamson 2014).

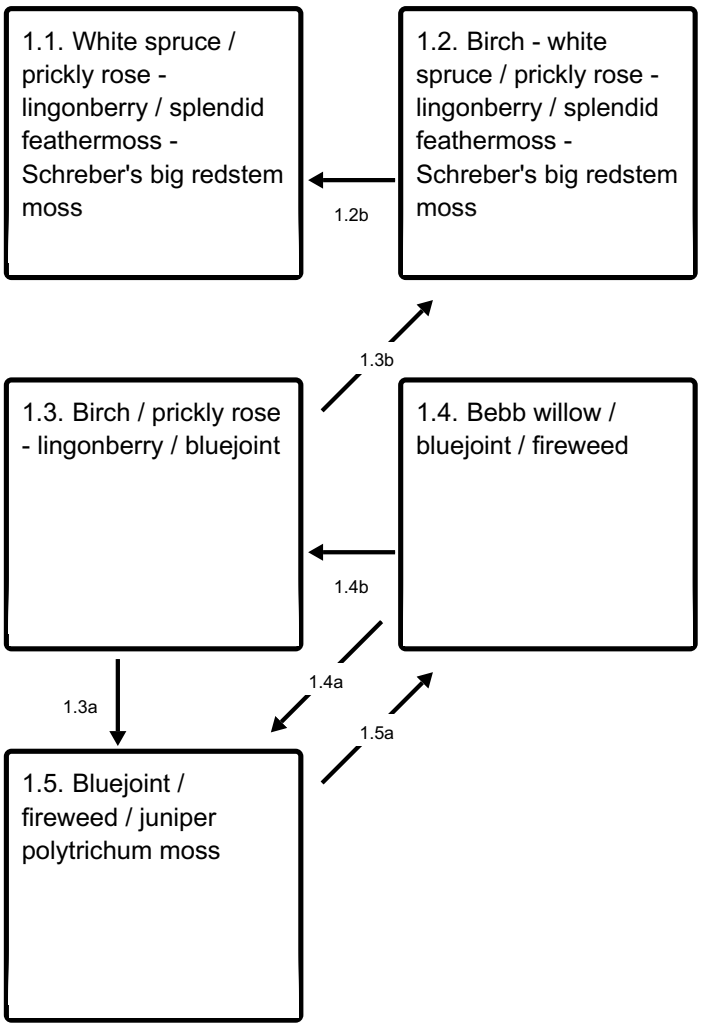
Lands associated with this ecological site may be burning more frequently than in the past, which may result in alternative pathways of succession. The historic fire return interval for white spruce stands in Interior Alaska occurs approximately once 150 years (Landfire2009; Abrahamson 2014). Due to global climate change, stands of spruce in certain portions of the Alaskan boreal forest are burning more frequently than these historic averages (Kelly et al. 2013). Increases to burn frequency favor forested stands dominated by quick-growing deciduous trees (community 1.3). A major reason being that increased fire frequency decreases the presence and abundance of mature, cone-bearing trees. Less mature trees result in less spruce seedlings post-fire and an overall decreased abundance of spruce in the developing forest canopy. Increased frequency in the boreal forest may result in alternative pathways of post-fire succession with stands of deciduous trees persisting for longer than normal durations of time (Johnstone et al. 2010).

State and transition model

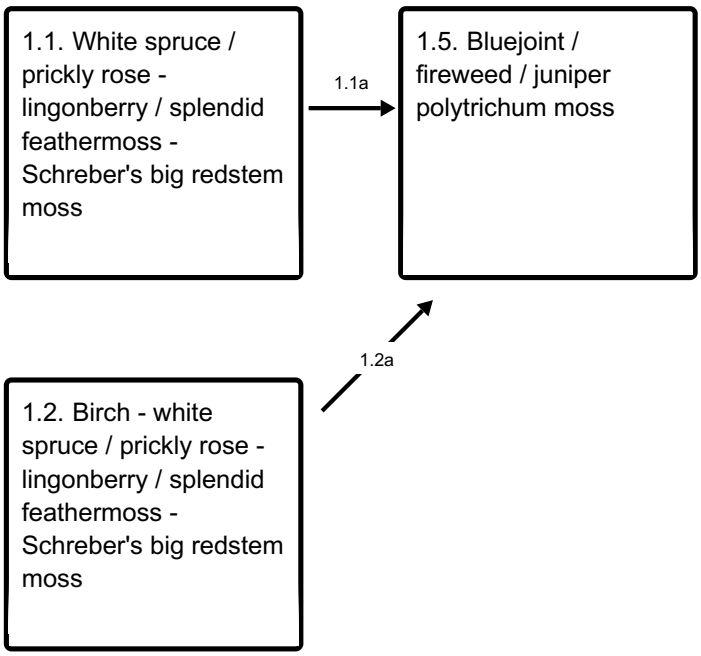
Ecosystem states

1. Reference state

State 1 submodel, plant communities



Communities 1, 5 and 2 (additional pathways)



1.1a - Fire

1.2b - Time without fire

1.2a - Fire

1.3b - Time without fire

1.3a - Fire

1.4b - Time without fire

1.4a - Fire

1.5a - Time without fire

State 1
Reference state

The reference plant community is open needleleaf forest (Viereck et al. 1992) with the dominant tree being white spruce (*Picea glauca*). There are five plant communities within the reference state related to fire.

Dominant plant species

- white spruce (*Picea glauca*), tree
- prickly rose (*Rosa acicularis*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous

Community 1.1
White spruce / prickly rose - lingonberry / splendid feathermoss - Schreber's big redstem moss

The reference plant community is characterized as open needleleaf forest (Viereck et al. 1992) with white spruce (*Picea glauca*) as the dominant tree. White spruce tree cover primarily occurs in the tall tree strata (greater than 40 feet). Live deciduous trees, primarily birch (Betula spp.), occasionally occur in the tree canopy but with limited cover. The soil surface is primarily covered with herbaceous litter and moss. Common understory species include Siberian alder (*Alnus viridis* ssp. fruticosa), prickly rose (*Rosa acicularis*), beauverd spirea (*Spiraea stevenii*), lingonberry (*Vaccinium vitis-idaea*), twinflower (*Linnaea borealis*), bluejoint (*Calamagrostis canadensis*), false toadflax (*Geocaulon lividum*), tall bluebells (*Mertensia paniculata*), bunchberry dogwood (*Cornus canadensis*), various reindeer lichen (Cladina spp.), splendid feathermoss, (*Hylocomium splendens*) and Schreber's big redstem moss (*Pleurozium schreberi*). The understory vegetative strata that characterize this community are dwarf shrubs (less than eight inches) and mosses.

Dominant plant species

- white spruce (*Picea glauca*), tree
- resin birch (*Betula neoalaskana*), tree
- quaking aspen (*Populus tremuloides*), tree
- lingonberry (*Vaccinium vitis-idaea*), shrub
- prickly rose (*Rosa acicularis*), shrub
- Siberian alder (*Alnus viridis ssp. fruticosa*), shrub

- twinflower (*Linnaea borealis*), shrub
- beauverd spirea (*Spiraea stevenii*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous
- false toadflax (*Geocaulon lividum*), other herbaceous
- tall bluebells (*Mertensia paniculata*), other herbaceous
- bunchberry dogwood (*Cornus canadensis*), other herbaceous

Community 1.2
Birch - white spruce / prickly rose - lingonberry / splendid feathermoss - Schreber's big redstem moss

Community 1.2 is in the late stage of fire-induced secondary succession for this ecological site. It is characterized as open mixed forest (Viereck et al. 1992) with mature birch (Betula spp.) and a mixture of immature and mature white spruce (*Picea glauca*) as the dominant trees. Tree cover is split between the tall tree (greater than 40 feet) and medium tree strata (between 15 and 40 feet). The soil surface is primarily covered with herbaceous litter and moss. Common understory species include Siberian alder (*Alnus viridis* ssp. fruticosa), prickly rose (*Rosa acicularis*), lingonberry (*Vaccinium vitis-idaea*), bog Labrador tea (*Ledum palustre* ssp. decumbens), twinflower (*Linnaea borealis*), false toadflax (*Geocaulon lividum*), tall bluebells (*Mertensia paniculata*), splendid feathermoss (Hylocomiumm splendens), and Schreber's big redstem moss (*Pleurozium schreberi*). The understory vegetative strata that characterize this community are low shrubs (between 8 and 36 inches), dwarf shrubs (less than 8 inches), and mosses.

Dominant plant species

- white spruce (*Picea glauca*), tree
- resin birch (*Betula neoalaskana*), tree
- quaking aspen (*Populus tremuloides*), tree
- lingonberry (*Vaccinium vitis-idaea*), shrub
- bog Labrador tea (*Ledum groenlandicum*), shrub
- Siberian alder (*Alnus viridis ssp. fruticosa*), shrub
- twinflower (*Linnaea borealis*), shrub
- prickly rose (*Rosa acicularis*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- beauverd spirea (*Spiraea stevenii*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous
- false toadflax (*Geocaulon lividum*), other herbaceous
- tall bluebells (*Mertensia paniculata*), other herbaceous
- horsetail (*Equisetum*), other herbaceous
- bunchberry dogwood (*Cornus canadensis*), other herbaceous

- stiff clubmoss (*Lycopodium annotinum*), other herbaceous

Community 1.3
Birch / prickly rose - lingonberry / bluejoint

Community 1.3 is in the middle stage of fire-induced secondary succession for this ecological site. It is characterized as closed deciduous forest (Viereck et al. 1992) with birch (Betula ssp.) the dominant tree. Seedlings and saplings of white spruce (*Picea glauca*) are common but have comparatively limited cover. Tree cover is split between the tall tree (greater than 40 feet) and medium tree strata (between 15 and 40 feet). The soil surface is primarily covered with herbaceous litter. Common understory species include Siberian alder (*Alnus viridis* spp. fruticosa), prickly rose (*Rosa acicularis*), lingonberry (*Vaccinium vitis-idaea*), bog Labrador tea (*Ledum palustre* ssp. decumbens), twinflower (*Linnaea borealis*), bluejoint (*Calamagrostis canadensis*), and splendid feathermoss (*Hylocomium splendens*). The understory vegetative strata that characterize this community are low shrubs (between 8 and 36 inches) and medium graminoids (between 4 and 24 inches).

Dominant plant species

- resin birch (*Betula neoalaskana*), tree
- white spruce (*Picea glauca*), tree
- quaking aspen (*Populus tremuloides*), tree
- Siberian alder (*Alnus viridis ssp. fruticosa*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- bog Labrador tea (*Ledum groenlandicum*), shrub
- twinflower (*Linnaea borealis*), shrub
- prickly rose (*Rosa acicularis*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- false toadflax (*Geocaulon lividum*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous

Community 1.4
Bebb willow / bluejoint / fireweed

Community 1.4 is in the early stage of fire-induced secondary succession for this ecological site. It is best characterized as open tall scrub (Viereck et al. 1992) with saplings of birch (Betula) and Bebb willow (*Salix bebbiana*) the dominant overstory vegetation. Other common species include bluejoint (*Calamagrostis canadensis*), fireweed (*Chamerion angustifolium*), juniper polytrichum moss (*Polytrichum juniperinum*), and ceratodon moss (Ceratodon spp.). The soil surface is primarily covered with woody litter, herbaceous litter, and mosses. The vegetative strata that characterize this community are medium shrubs (between 3 and 10 feet), tall graminoids (greater than 2 feet), and mosses.

Dominant plant species

- resin birch (*Betula neoalaskana*), tree
- quaking aspen (*Populus tremuloides*), tree
- Bebb willow (*Salix bebbiana*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- fireweed (*Chamerion angustifolium*), other herbaceous
- juniper polytrichum moss (*Polytrichum juniperinum*), other herbaceous
- ceratodon moss (*Ceratodon purpureus*), other herbaceous
- bunchberry dogwood (*Cornus canadensis*), other herbaceous

Community 1.5
Bluejoint / fireweed / juniper polytrichum moss

Community 1.5 is in the pioneering stage of fire-induced secondary succession for this ecological site. It is characterized as a mesic forb or mesic graminoid herbaceous community (Viereck et al. 1992). Tree seedlings, primarily resin birch (Betula spp.) and white spruce (*Picea glauca*), are common throughout the community but have limited cover. Commonly observed species include Bebb willow (*Salix bebbiana*), bluejoint (*Calamagrostis canadensis*), fireweed (Chamerion angustifoliium), Alaska wild rhubarb (*Polygonum alpinum*), juniper polytrichum moss (polytrichum juniperiium), and ceratodon moss (Ceratodon spp.). Although areas of exposed bare soil are common (up to 40 percent of the plot), the soil surface is primarily covered with a mixture of weedy bryophyte species, woody debris, and herbaceous litter.

Dominant plant species

- Bebb willow (*Salix bebbiana*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- Altai fescue (*Festuca altaica*), grass
- fireweed (*Chamerion angustifolium*), other herbaceous
- ceratodon moss (*Ceratodon purpureus*), other herbaceous
- juniper polytrichum moss (*Polytrichum juniperinum*), other herbaceous
- Alaska wild rhubarb (*Polygonum alpinum*), other herbaceous

Pathway 1.1a
Community 1.1 to 1.5

A fire sweeps through and incinerates much of the above ground vegetation. Because of the associated dry soils, this ecological 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

Time without fire. White spruce (*Picea glauca*) replaces resin birch in the tree canopy and the community turns into a needleleaf forest community.

Pathway 1.2a
Community 1.2 to 1.5

A fire sweeps through and incinerates much of the above ground vegetation. Because of the associated dry soils, this ecological 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 1.3b
Community 1.3 to 1.2

Time without fire. White spruce (*Picea glauca*) cover increases and the community turns into a mixed forest community.

Pathway 1.3a
Community 1.3 to 1.5

A fire sweeps through and incinerates much of the above ground vegetation. Because of the associated dry soils, this ecological 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 1.4b
Community 1.4 to 1.3

Time without fire. Resin birch mature are turn into a deciduous forest community.

Pathway 1.4a
Community 1.4 to 1.5

A fire sweeps through and incinerates much of the above ground vegetation. Because of the associated dry soils, this ecological 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 1.5a
Community 1.5 to 1.4

Time without fire. Deciduous tree and willow (Salix spp.) cover increases.

Additional community tables

Inventory data references

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

Plant community composition is largely based on ecological sites from Major Land Resource Area (MLRA) 231X: Interior Alaska Highlands.

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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	03/26/2026
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:**

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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):**

---

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:**

17. **Perennial plant reproductive capability:**