USDA Natural Resources Conservation Service

Ecological site R231XY130AK
Boreal Scrubland Gravelly Floodplain

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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): 231X–Interior Alaska Highlands

The Interior Alaska Uplands (MLRA 231X) is in the Interior Region of Alaska and includes the extensive hills, mountains, and valleys between the Tanana River to the south and the Brooks Range to the north. These hills and mountains surround the Yukon Flats Lowlands (MLRA 232X). MLRA 231X makes up about 69,175 square miles. The hills and mountains of the area tend to be moderately steep to steep resulting in high-relief slopes. The mountains are generally rounded at lower elevations and sharp-ridged at higher elevations. Elevation ranges from about 400 feet in the west, along the boundary with the Interior Alaska Lowlands (MLRA 229X), to 6,583 feet at the summit of Mt. Harper, in the southeast. Major tributaries include large sections of the Yukon, Koyukuk, Kanuti, Charley, Coleen, and Chatanika Rivers. This area is traversed by several major roads, including the Taylor Highway in the east and the Steese, Elliott, and Dalton Highways north of Fairbanks. The area is mostly undeveloped wild land that is sparsely populated. The largest community along the road system is Fairbanks with smaller communities like Alatna, Allakaket, Chicken, Eagle, Eagle Village, Hughes, and Rampart occurring along the previously mentioned rivers and highways.

The vast majority of this MLRA was unglaciated during the Pleistocene epoch with the exceptions being the highest mountains and where glaciers extended into the area from the Brooks Range. For the most part, glacial moraines and drift are limited to the upper elevations of the highest mountains. Most of the landscape is mantled with bedrock colluvium originating from the underlying bedrock. Valley bottoms are filled with Holocene fluvial deposits and colluvium from the adjacent mountain slopes. Silty loess, which originated from unvegetated flood plains in and adjacent to this area, covers much of the surface. On hill and mountain slopes proximal to major river valleys (e.g., Tanana and Yukon Rivers), the loess is many feet thick. As elevation and distance from major river valleys increases, loess thickness decreases significantly. Bedrock is commonly exposed on the highest ridges.

This area is in the zone of discontinuous permafrost. Permafrost commonly is close to the surface in areas of the finer textured sediments throughout the MLRA. Isolated masses of ground ice occur in thick deposits of loess on terraces and the lower side slopes of hills. Solifluction lobes, frost boils, and circles and stripes are periglacial features common on mountain slopes in this area. Pingos, thermokarst pits and mounds, ice-wedge polygons, and earth hummocks are periglacial features common on terraces, lower slopes of hills and mountains, and in upland valleys in the area.

The dominant soil orders in this area are Gelisols, Inceptisols, Spodosols, and Entisols. The soils in the area have a subgelic or cryic soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. Gelisols are common on north facing slopes, south facing footslopes, valley bottoms, and stream terraces. Gelisols are typically shallow or moderately deep to permafrost (10 to 40 inches) and are poorly or very poorly drained. Wildfires can disturb the insulating organic material at the surface, lowering the permafrost layer, eliminating perched water tables from Gelisols, and thus changing the soil classification. Inceptisols and Spodosols commonly form on south facing hill and mountain slopes. Entisols are common on flood plains and high elevation mountain slopes. Miscellaneous (non-soil) areas make up about 2 percent of this MLRA. The most common miscellaneous areas are rock outcrop and rubble land. In many valleys placer mine tailings are common.

Short, warm summers and long, cold winters characterize the subarctic continental climate of the area. The mean annual temperature of the area ranges from 22 to 27 degrees F. The mean annual temperature of the southern half of the area is approximately 3 degrees warmer compared to the northern half (PRISM 2018). The warmest months span June through August with mean monthly temperatures ranging from 50 to 56 degrees F. The coldest months span November through February with mean monthly temperatures ranging from -5 to 3 degrees F. When compared to the high-elevation alpine and subalpine life zones, the lower elevation boreal life zone tends to be 2-3 degrees F colder during the coldest months and 1-2 degrees F warmer during the warmest months (PRISM 2018). The freeze-free period at the lower elevations averages about 60 to 100 days, and the temperature usually remains above freezing from June through mid-September.

Precipitation is limited across this area, with the average annual precipitation ranging from 12 to 19 inches. The southern half of the areas receives approximately 2.5 inches more annual precipitation then the northern half (PRISM 2018). The lower elevation boreal life zone receives approximately 2.5 inches less annual precipitation than the high-elevation alpine and subalpine life zones (PRISM 2018). Approximately 3/5th of the annual precipitation occurs during the months of June through September with thunderstorms being common. The average annual snowfall ranges from about 45 to 100 inches. The ground is consistently covered with snow from November through March.

Most of this area is forested below an elevation of about 2500 feet. Dominant tree species on slopes are white spruce and black spruce. Black spruce stands are most common on north-facing slopes, stream terraces, and other sites with poor drainage and permafrost. White spruce stands are most common on warm slopes with dry soils. At lower elevations, lightning-caused wildfires are common, often burning many thousands of acres during a single fire. 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

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 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 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 ≥ 1 m 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 2500 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 (>10% 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 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

Landfire BPS – 6916141 – Western North American Boreal Montane Floodplain Forest and Shrubland - Boreal

Ecological site concept

This site occurs on the low flood plains of montane rivers that flood frequently and have gravelly soils. In this area, the flood plain of montane rivers have been divided into low and high flood plain positions. When compared to high flood plains, low flood plain positions have comparably more frequent and longer duration flood events. On the low flood plain, flooding occurs frequently (greater than 50 times in 100 years) for brief to long durations of time (2 to 30 days). These differences in the flood regime result in the low flood plain supporting shrub dominant communities and the high flood plain supporting forested communities. Soils are moderately well drained and lack permafrost. The typical soil profile has minimal to no organic matter over a very thick layer of loamy, sandy, and gravelly alluvium.

Field work indicates that certain sampled communities within the reference state flood more frequently and/or severely then other communities. As flooding frequency and duration increases, shrub cover and shrub height decrease significantly. Given this observation, more frequently and severely flooded plant communities are incorporated into the reference state.

For this site, reference community 1.1 has the less frequent and shortest duration flood events and is characterized as closed tall scrub (Viereck et al. 1992) with the dominant tall scrub being feltleaf willow. closed deciduous forest (Viereck et al. 1992) with the dominant tree being balsam poplar. Balsam poplar and white spruce seedling, saplings, and immature trees are common but are not dominant in the overstory. Other commonly observed species include thinleaf alder, prickly rose, squashberry, bluejoint, northern bedstraw, Tilesius' wormwood, tall bluebells, and various horsetail species.

Associated sites

F231XY171AK	**Boreal Woodland Loamy Frozen Terraces** Occurs on adjacent stream terraces that no longer flood. Soils have permafrost and support black spruce woodlands.
F231XY131AK	**Boreal Forest Gravelly Floodplain** Occurs on the high flood plain of the same montane streams supporting forested vegetation.
R231XY138AK	**Boreal Sedge Loamy Flood Plain Depressions** Occurs on flood plain depressions supporting sedge dominant communities.
F231XY169AK	**Boreal Woodland Peat Frozen Flats** Occurs on adjacent stream terraces that no longer flood. Soils have permafrost and support black spruce woodlands.

Similar sites

XA232X01Y200	**Boreal Scrub Loamy Flood Plain Low** Occurs on the low flood plain of high-order streams in the Yukon Flats Lowlands.
R231XY198AK	**Boreal Scrubland Loamy Flood Plain** Occurs on the low flood plain of high-order streams like the Yukon River. The soils and flood regime are different between these two types of river systems, which result in different kinds and amounts of vegetation.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix alaxensis*
Herbaceous	(1) *Calamagrostis canadensis*

Physiographic features

This boreal site occurs on low flood plains of montane rivers. The boreal life zone typically occurs below 2500 feet with this site occasionally occurring as high as 2850 feet. These flood plains typically have negligible slopes ranging between 0 and 3 percent and occur on all aspects. Flooding occurs frequently for brief to long durations of time. During high-water and flooding, the water table is commonly at the soil surface. After the high-water recedes, the water table commonly goes to deep or greater depths. This site provides very low runoff to adjacent sites.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Flood plain
Runoff class	Very low
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Frequent
Ponding frequency	None
Elevation	650–2,500 ft
Slope	0–3%
Water table depth	0–20 in
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding duration	Not specified
Flooding frequency	Occasional to frequent
Ponding frequency	Not specified
Elevation	300–2,850 ft
Slope	0–7%
Water table depth	0 in

Climatic features

Short, warm summers and long, cold winters characterize the subarctic continental climate associated with this boreal site. The mean annual temperature of the site ranges from 22 to 27 degrees F. The warmest months span June through August with mean normal maximum monthly temperatures ranging from 60 to 66 degrees F. The coldest months span November through February with mean normal minimum temperatures ranging from -3 to -12 degrees F. The freeze-free period for the site ranges from 80 to 120 days, and the temperature usually remains above freezing from late May through mid-September.

The area receives minimal annual precipitation with the summer months being the wettest. Average annual precipitation across the area typically ranges between 12 to 18 inches. Approximately 3/5th of the annual precipitation occurs during the months of June through September with thunderstorms common. The average annual snowfall ranges from about 45 to 100 inches. The ground is consistently covered with snow from November through March.

Table 4. Representative climatic features

Frost-free period (characteristic range)	16-78 days
Freeze-free period (characteristic range)	76-114 days
Precipitation total (characteristic range)	12-18 in
Frost-free period (actual range)	4-87 days
Freeze-free period (actual range)	48-120 days

Precipitation total (actual range)	9-20 in
Frost-free period (average)	53 days
Freeze-free period (average)	90 days
Precipitation total (average)	15 in

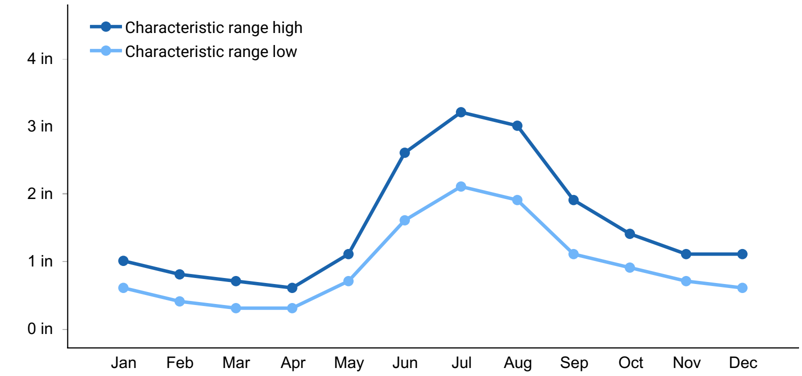


Figure 1. Monthly precipitation range

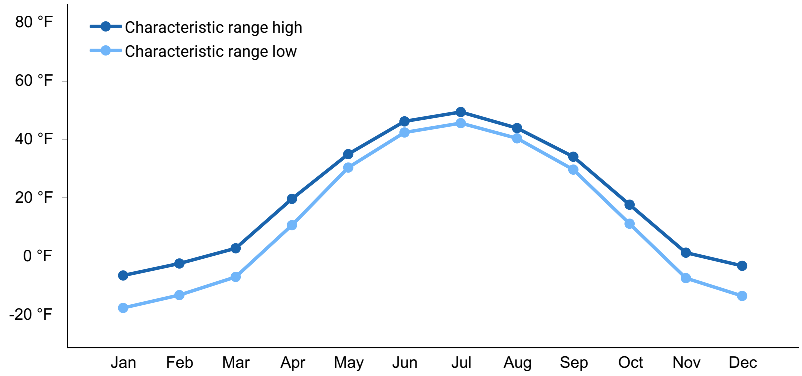


Figure 2. Monthly minimum temperature range

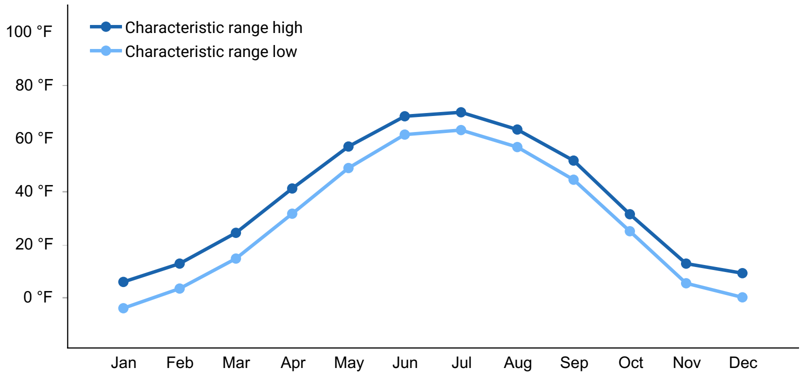


Figure 3. Monthly maximum temperature range

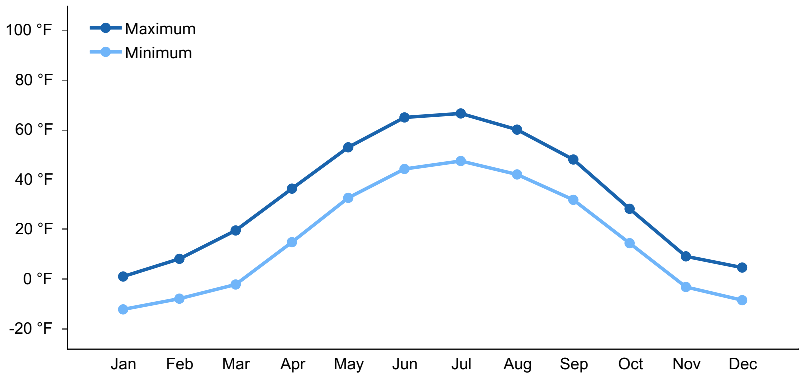


Figure 4. Monthly average minimum and maximum temperature

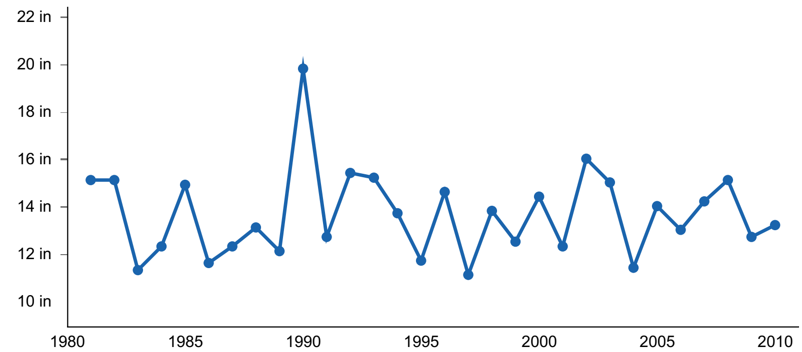


Figure 5. Annual precipitation pattern

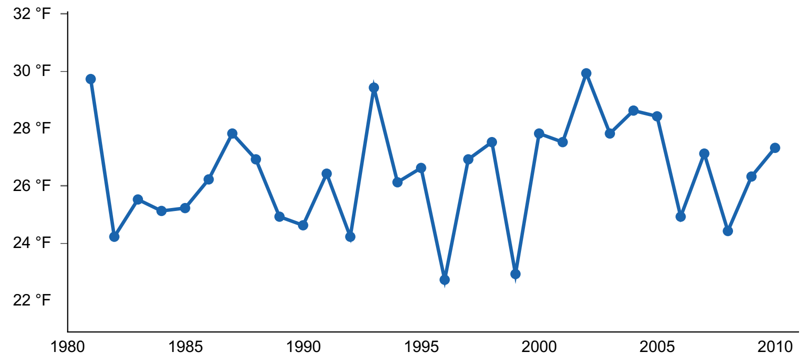


Figure 6. Annual average temperature pattern

Climate stations used

- (1) EAGLE AP [USW00026422], Tok, AK
- (2) CHICKEN [USC00501684], Tok, AK
- (3) MILE 42 STEESE [USC00505880], Fairbanks, AK
- (4) BETTLES AP [USW00026533], Bettles Field, AK
- (5) CIRCLE HOT SPRINGS [USC00501987], Central, AK
- (6) FT KNOX MINE [USC00503160], Fairbanks, AK
- (7) GILMORE CREEK [USC00503275], Fairbanks, AK
- (8) FOX 2SE [USC00503181], Fairbanks, AK
- (9) ESTER DOME [USC00502868], Fairbanks, AK
- (10) ESTER 5NE [USC00502871], Fairbanks, AK
- (11) COLLEGE 5 NW [USC00502112], Fairbanks, AK
- (12) COLLEGE OBSY [USC00502107], Fairbanks, AK
- (13) KEYSTONE RIDGE [USC00504621], Fairbanks, AK

Influencing water features

This site is classified as a Riverine wetland under the Hydrogeomorphic (HGM) classification system (Smith et al.

1995; USDA-NRCS 2008). In the associated low flood plains, overbank flow from the channel and subsurface hydraulic connections between the stream and adjacent wetlands are the main sources of water (Smith et al. 1995).

Depth to the water table may decrease following summer storm events or spring snowmelt and increase during extended dry periods.

Wetland description

n/a

Soil features

Soils formed in sandy and gravelly alluvium and do not have permafrost. Rock fragments on the soil surface are typically absent. These are mineral soils commonly capped with 0 to 2 inches of organic material. The mineral soil below the organic material is often stratified layers of fine sand and silt loam, which typically have minimal rock fragments. This surface mineral horizon is highly variable ranging in thickness from 0 to 10 inches or more. Below this horizon are thick layers of sands and gravelly sands with rock fragments ranging between 20 and 60 percent of the soil profile by volume. These are very deep soils without restrictive layers. The pH of the soil profile typically ranges from moderately acidic to slightly alkaline. The soils are wet during high-water and flood events and are commonly considered somewhat poorly to moderately well drained.

Figure 7. A typical soil profile on the low flood plain of montane streams in the area. The photo shows bands of silty and sandy horizons.

Figure 8. Another soil profile for this site. The photo shows a thick layer of sandy and gravelly alluvium.

Table 5. Representative soil features

Parent material	(1) Alluvium

Surface texture	(1) Silt loam (2) Fine sand (3) Gravelly fine sandy loam (4) Very cobbly coarse sandy loam
Family particle size	(1) Sandy or sandy-skeletal (2) Sandy-skeletal
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Moderately rapid to rapid
Depth to restrictive layer	Not specified
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	0.8–3.4 in
Calcium carbonate equivalent (10-40in)	0%
Clay content (0-20in)	3–5%
Electrical conductivity (10-40in)	0–3 mmhos/cm
Sodium adsorption ratio (10-40in)	0
Soil reaction (1:1 water) (10-40in)	5.9–7.5
Subsurface fragment volume <=3" (0-60in)	20–50%
Subsurface fragment volume >3" (0-60in)	0–10%

Table 6. Representative soil features (actual values)

Drainage class	Somewhat poorly drained to somewhat excessively drained
Permeability class	Not specified
Depth to restrictive layer	Not specified
Soil depth	Not specified
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-40in)	0.6–11.8 in
Calcium carbonate equivalent (10-40in)	Not specified
Clay content (0-20in)	Not specified
Electrical conductivity (10-40in)	Not specified
Sodium adsorption ratio (10-40in)	Not specified
Soil reaction (1:1 water) (10-40in)	5.6–8

Subsurface fragment volume <=3" (0-60in)	0–73%
Subsurface fragment volume >3" (0-60in)	0–32%

Ecological dynamics

Flooding

Montane streams in this area have low and/or high flood plain sites. These flood plain sites represent major breaks in the flood regime and dominant vegetative type on associated streams. The low flood plain site floods frequently (>50 times in 100 years) for brief to long durations of time (2 to 30 days) and supports shrub dominant plant communities. The high flood plain site floods occasionally to rarely (1 to 50 times in 100 years) for brief durations of time (2 to 7 days) and supports forested plant communities.

The shift of vegetative type from shrubland to forest represents riparian primary succession along major streams in the area. On other Interior Alaska flood plains, this successional process is thought to take between 200 and 300 years (Chapin et al. 2006). The flood regime, growth traits of vegetation, biotic competition, and a slew of other factors contribute to the dynamic nature of boreal flood plain succession. For more detailed information on boreal flood plain succession and successional drivers, refer to Walker et al. (1986) and Chapin et al. (2006).

Field work indicates that differences in flood frequency and duration result in different plant communities for this site. Sample plots thought to flood more frequently have significant decreases to willow and alder height and cover. Given this observation, more frequently and severely flooded plant communities were incorporated into the reference state (community 1.2 and 1.3). These plant communities represent the successional transition from river wash to the reference plant community (community 1.1).

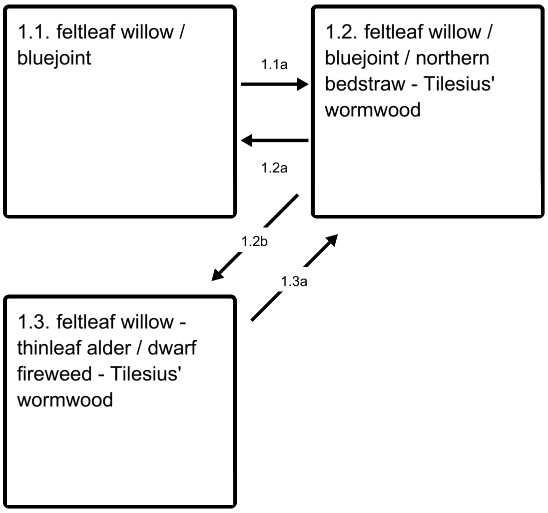
These montane streams typically have terrace sites (see F231XY169AK and F231XY171AK). When compared to montane flood plains, stream terraces occur on higher landform positions that are often further away from the active stream channel. These montane stream terraces no longer flood. Stream terraces have thick peat layers, contact permafrost at shallow to moderate depths, commonly pond, and have wetter soils. Stream terraces support much less productive stands of black spruce (*Picea mariana*).

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities



1.1a - More frequent and longer duration flooding.

1.2a - Less frequent and shorter duration flooding.

1.2b - More frequent and longer duration flooding.

1.3a - Less frequent and shorter duration flooding.

State 1
Reference State

Figure 9. Closed tall scrub community dominated by willow on a low flood plain in the area.

Multiple plant communities occur within the reference state and the vegetation differs in large part due to flooding. The frequent flooding that occurs for long durations of time prevents the establishment of trees and development of forested plant communities. For this site, plant community 1.1 has the least frequent and shortest duration flood events. This community is characterized as closed tall scrub (Viereck et al. 1992) with the dominant tall scrub being feltleaf willow. If flooding becomes less frequent and lasts for shorter durations of time, balsam poplar and white spruce gain dominance and the ecological site shifts to the high flood plain.

Dominant plant species

- feltleaf willow (*Salix alaxensis*), shrub
- bluejoint (*Calamagrostis canadensis*), grass

Community 1.1
feltleaf willow / bluejoint


Figure 10. A typical plant community associated with community 1.1.

The reference plant community is characterized as closed tall scrub (Viereck et al. 1992), which is primarily composed of feltleaf willow. Within the reference state for this site, this community has the least severe flood regime. Balsam poplar and white spruce seedling, saplings, and immature trees are common but are not dominant in the overstory. Other commonly observed species include thinleaf alder, prickly rose, squashberry, bluejoint, northern bedstraw, Tilesius' wormwood, tall bluebells, and horsetail. The vegetative strata that characterize this community phase are tall shrubs (greater than 10 feet) and tall graminoids (greater than 2 feet). The soil surface is primarily covered with herbaceous litter and woody debris, but large patches of exposed bare soil can occur (as much as 60 percent of plot).

Forest overstory. Cover from seedlings and saplings (tree regeneration) were not included in the overstory canopy cover values but are included in the cover percent values for individual tree species.

The balsam poplar overstory canopy cover was occasionally over 10 percent cover. In these rare instances, community 1.1 was classified as a broadleaf woodland.

Dominant plant species

- feltleaf willow (*Salix alaxensis*), shrub
- prickly rose (*Rosa acicularis*), shrub
- thinleaf alder (*Alnus incana ssp. tenuifolia*), shrub
- squashberry (*Viburnum edule*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- northern bedstraw (*Galium boreale*), other herbaceous
- Tilesius' wormwood (*Artemisia tilesii*), other herbaceous
- horsetail (*Equisetum*), other herbaceous

Community 1.2
feltleaf willow / bluejoint / northern bedstraw - Tilesius' wormwood

Figure 11. A typical plant community associated with community 1.2.

Community 1.2 is characterized as closed low scrub (Viereck et al. 1992) primarily composed of feltleaf willow. Balsam poplar seedlings and saplings are common but are not a dominant overstory species. Commonly observed species include thin leaf alder, Siberian alder, prickly rose, bluejoint, northern bedstraw, fireweed, Tilesius' wormwood, and field horsetail. The vegetative strata that characterize this community are medium shrubs (between 3 and 10 feet), medium graminoids (between 4 and 24 inches), and medium forbs (between 4 and 24 inches). The soil surface is primarily covered with herbaceous litter and woody debris, but large patches of exposed bare soil and surface rock fragments can occur (as much as 100 percent of plot).

Dominant plant species

- feltleaf willow (*Salix alaxensis*), shrub
- Siberian alder (*Alnus viridis ssp. fruticosa*), shrub
- thinleaf alder (*Alnus incana ssp. tenuifolia*), shrub
- prickly rose (*Rosa acicularis*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- northern bedstraw (*Galium boreale*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous
- Tilesius' wormwood (*Artemisia tilesii*), other herbaceous
- field horsetail (*Equisetum arvense*), other herbaceous

Community 1.3
feltleaf willow - thinleaf alder / dwarf fireweed - Tilesius' wormwood

Figure 12. A typical plant community associated with community 1.2.

Community 1.3 is sparsely vegetated and is often characterized as open low scrub (Viereck et al. 1992) with dominant shrubs being feltleaf willow and thinleaf alder. Within the reference state for this site, this community has the most severe flood regime. Balsam poplar and white spruce seedlings and saplings are common but are not a dominant overstory species. This community is highly diverse. Commonly observed species include shrubby cinquefoil, bluejoint, various bluegrass species, tufted wheatgrass, tufted hairgrass, dwarf fireweed, Tilesius' wormwood, alpine sweetvetch, and arctic lupine. The vegetative strata that characterize this community are regenerating trees (less than 15 feet), low shrubs (between 8 and 36 inches), medium forbs (between 4 and 24 inches), and medium graminoids (between 4 and 24 inches). Large patches of exposed bare soil and rock fragments are common (as much as 100 percent of plot).

Dominant plant species

- feltleaf willow (*Salix alaxensis*), shrub
- thinleaf alder (*Alnus incana ssp. tenuifolia*), shrub
- shrubby cinquefoil (*Dasiphora fruticosa*), shrub
- Siberian alder (*Alnus viridis ssp. fruticosa*), shrub
- prickly rose (*Rosa acicularis*), shrub
- bluegrass (*Poa*), grass
- tufted hairgrass (*Deschampsia cespitosa*), grass

- tufted wheatgrass (*Elymus macrourus*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- spike trisetum (*Trisetum spicatum*), grass
- dwarf fireweed (*Chamerion latifolium*), other herbaceous
- Tilesius' wormwood (*Artemisia tilesii*), other herbaceous
- alpine sweetvetch (*Hedysarum alpinum*), other herbaceous
- arctic lupine (*Lupinus arcticus*), other herbaceous
- common yarrow (*Achillea millefolium*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous
- elegant hawksbeard (*Crepis elegans*), other herbaceous
- field horsetail (*Equisetum arvense*), other herbaceous
- dwarf scouringrush (*Equisetum scirpoides*), other herbaceous
- bitter fleabane (*Erigeron acris*), other herbaceous
- arctic aster (*Eurybia sibirica*), other herbaceous
- marsh grass of Parnassus (*Parnassia palustris*), other herbaceous
- merckia (*Wilhelmsia physodes*), other herbaceous

Pathway 1.1a
Community 1.1 to 1.2

feltleaf willow / bluejoint

feltleaf willow / bluejoint / northern bedstraw - Tilesius' wormwood

More frequent and longer duration flooding. The reference state for this ecological site floods frequently for long periods of time (> 50 times in 100 years). Areas that are thought to flood less frequently are represented by community 1.1 and areas that are thought to flood more frequently are represented by community 1.2 and 1.3. When compared to community 1.1, the more frequently flooded plant community (community 1.2) shorter shrubs and less willow cover.

Pathway 1.2a
Community 1.2 to 1.1

feltleaf willow / bluejoint / northern bedstraw - Tilesius' wormwood

feltleaf willow / bluejoint

Less frequent and shorter duration flooding. Areas that are thought to flood less frequently are represented by community 1.1 and areas that are thought to flood more frequently are represented by community 1.2. When compared to community 1.1, the more frequently flooded plant community has shorter shrubs and less willow cover.

Pathway 1.2b
Community 1.2 to 1.3

feltleaf willow / bluejoint / northern bedstraw - Tilesius' wormwood

feltleaf willow - thinleaf alder / dwarf fireweed - Tilesius' wormwood

More frequent and longer duration flooding. Areas that are thought to flood less frequently are represented by community 1.2 and areas that are thought to flood more frequently are represented by community 1.3. When compared to community 1.2, the more frequently flooded plant communities have less shrub cover.

Pathway 1.3a
Community 1.3 to 1.2

feltleaf willow - thinleaf alder / dwarf fireweed - Tilesius' wormwood

feltleaf willow / bluejoint / northern bedstraw - Tilesius' wormwood

Less frequent and shorter duration flooding. Areas that are thought to flood less frequently are represented by community 1.2 and areas that are thought to flood more frequently are represented by community 1.3. When compared to community 1.2, the more frequently flooded plant community has less willow and alder cover.

Additional community tables

Table 7. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
balsam poplar	POBA2	*Populus balsamifera*	Native	–	0–15	–	–
white spruce	PIGL	*Picea glauca*	Native	10–15	0–10	1.5–2.3	–

Table 8. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
bluejoint	CACA4	*Calamagrostis canadensis*	Native	2–4	2–85
Forb/Herb					
tall bluebells	MEPA	*Mertensia paniculata*	Native	0.3–2	0–6
Tilesius' wormwood	ARTI	*Artemisia tilesii*	Native	2–3	0.1–6
northern bedstraw	GABO2	*Galium boreale*	Native	0.3–2	0.1–5
larkspurleaf monkshood	ACDE2	*Aconitum delphiniifolium*	Native	2–3	0–3
arctic aster	EUSI13	*Eurybia sibirica*	Native	0.4–2	0–1
fireweed	CHAN9	*Chamerion angustifolium*	Native	2–4	0–1
alpine sweetvetch	HEAL	*Hedysarum alpinum*	Native	0.4–2	0–1
Shrub/Subshrub					
feltleaf willow	SAAL	*Salix alaxensis*	Native	10–20	30–85
prickly rose	ROAC	*Rosa acicularis*	Native	2.5–4	0–40
thinleaf alder	ALINT	*Alnus incana ssp. tenuifolia*	Native	10–15	0–30
squashberry	VIED	*Viburnum edule*	Native	3–6	0–15

Animal community

n/a

Hydrological functions

n/a

Recreational uses

n/a

Wood products

n/a

Other products

n/a

Other information

n/a

Inventory data references

Tier 2 sampling plots used to develop the reference state. Plot numbers as recorded in NASIS with associated community phase.

Community 1.1

09TC03805, 2015AK290977, 2016AK290402, 2016AK290427, 2016AK290587, 2016AK290620

Community 1.2

09NP00401, 09TC03801, 10NP01704, 11BB04205, 11BE00302, 2015AK290503, 2015AK290512, 2015AK290514, 2016AK290425, 2016AK290733

Community 1.3

09TC03806, 10NP01701, 10TC04802, 11MC01005

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Approval

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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	05/11/2025
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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:**