USDA Natural Resources Conservation Service

Ecological site R231XY137AK
Boreal Sedge Peat Depressions

Last updated: 2/13/2024
Accessed: 11/14/2024

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 – 7416170 – Western North American Boreal Shrub and Herbaceous Floodplain Wetland (Landfire 2009)

Ecological site concept

This boreal site occurs on depressions of stream terraces with a thick layer of saturated organic material. These depressions are commonly abandoned channels. Soils lack permafrost, pond frequently for long durations of time, and are considered poorly to very poorly drained. The typical soil profile is a very thick layer of organic material over loamy alluvium. These very wet soils result in abundant wetland indicator plants and vegetation that is significantly different when compared to adjacent stream terraces with drier soils.

Two plant communities occur within the reference state. Community 1.1 occurs in the depressions and supports sedge dominant communities, while community 1.2 occurs on the edges of the depression and supports shrub dominant communities. When compared to the depression edge, the center of the depression has wetter soils that pond more frequently. Community 1.1 is characterized as wet graminoid herbaceous (Viereck et al. 1992) with the dominant species being water sedge. For the reference plant community, other commonly observed species include bog rosemary, leatherleaf, bluejoint, mud sedge, sheathed sedge, tall cottongrass, purple marshlocks, buckbean, and Sphagnum.

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.
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

R231XY138AK	**Boreal Sedge Loamy Flood Plain Depressions** Occurs on depressions of flood plains. Mineral soils are covered with minimal organic material. The flood regime results in unique kinds and amounts of vegetation.
XA232X01Y212	**Boreal Sedge Peat Terrace Depressions** Occurs on similar terrace depressions in the Yukon Flats Lowlands area.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Carex aquatilis* (2) *Equisetum fluviatile*

Physiographic features

This boreal site most commonly occurs on depressions and abandoned channels of stream terraces. On occasion, this site occurs on depressions of flood plains. Associated depressions have negligible slope and occur on all aspects. This site is associated with the boreal life zone which typically occurs below 2500 feet in this area. On rare occasions, elevation can range up to 2850 feet. These depressions frequently pond for long to very long durations of time. During ponding events, water can commonly be 0 to 12 inches above the soil surface. While flooding does not typically occur, depressions on flood plains can flood frequently for very long durations of time. A water table remains at very shallow depth throughout the growing season. This site provides negligible runoff to adjacent sites.

Table 2. Representative physiographic features

Slope shape across	(1) Concave
Slope shape up-down	(1) Concave
Landforms	(1) Alluvial plain > Stream terrace (2) Alluvial plain > Flood plain (3) Alluvial plain > Depression (4) Alluvial plain > Abandoned channel
Runoff class	Negligible
Flooding frequency	None
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Frequent
Elevation	107–762 m
Slope	0%
Ponding depth	0–30 cm
Water table depth	0 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 duration	Not specified
Ponding frequency	Not specified
Elevation	91–869 m
Slope	0–5%
Ponding depth	Not specified
Water table depth	Not specified

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)	305-457 mm
Frost-free period (actual range)	4-87 days
Freeze-free period (actual range)	48-120 days

Precipitation total (actual range)	229-508 mm
Frost-free period (average)	53 days
Freeze-free period (average)	90 days
Precipitation total (average)	381 mm

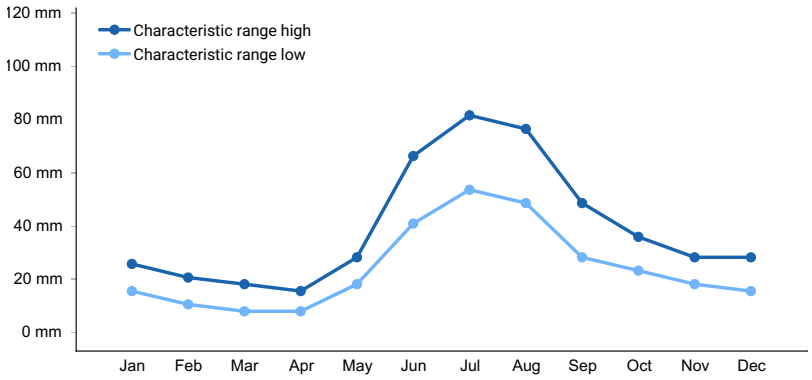


Figure 1. Monthly precipitation range

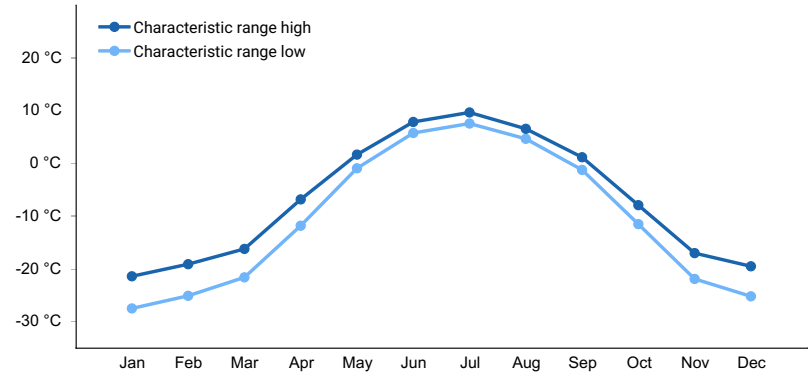


Figure 2. Monthly minimum temperature range

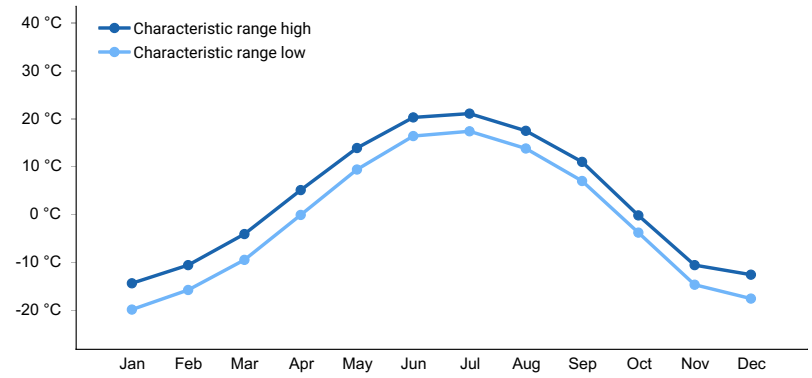


Figure 3. Monthly maximum temperature range

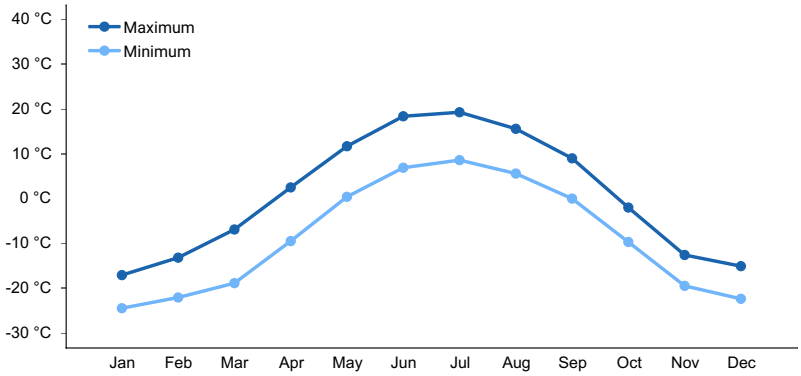


Figure 4. Monthly average minimum and maximum temperature

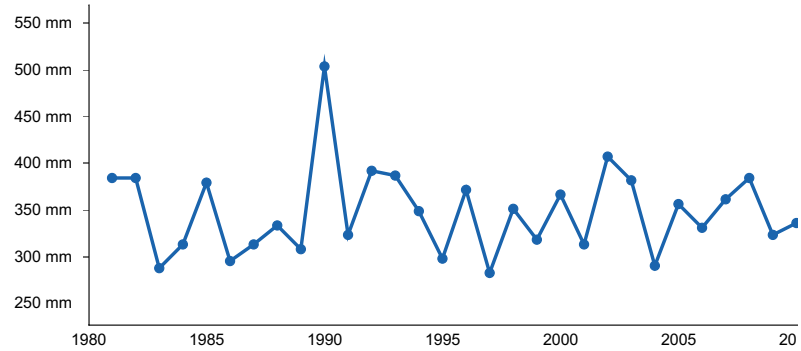


Figure 5. Annual precipitation pattern

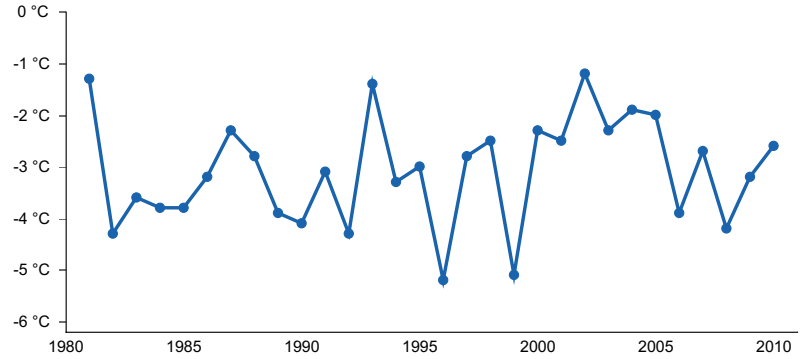


Figure 6. Annual average temperature pattern

Climate stations used

- (1) 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 Depressional wetland under the Hydrogeomorphic (HGM) classification system (Smith et

al. 1995; USDA-NRCS 2008). In the associated abandoned channels, precipitation, overland flow, or interflow 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 loamy alluvium and lack permafrost. These are mineral soils commonly capped with 15 to 40 inches of muck and peat. The mineral soil below the organic material is a silt loam formed from alluvium. Rock fragments are absent on the soil surface and throughout the soil profile. These soils have no restrictions and are very deep. The pH of the soil profile ranges from strongly acidic to slightly alkaline. The soils are wet for long portions of the growing season and are considered very poorly to poorly drained.

Figure 7. A typical soil profile associated with this site.

Table 5. Representative soil features

Parent material	(1) Organic material (2) Alluvium
Surface texture	(1) Peat (2) Muck
Drainage class	Very poorly drained to poorly drained
Permeability class	Moderately rapid
Depth to restrictive layer	Not specified
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	24.64–39.62 cm
Calcium carbonate equivalent (25.4-101.6cm)	0%
Clay content (0-50.8cm)	0–5%
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)	5.2–7.8
Subsurface fragment volume <=3" (0-152.4cm)	0%
Subsurface fragment volume >3" (0-152.4cm)	0%

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"	Not specified
Available water capacity (0-101.6cm)	1.27–39.62 cm
Calcium carbonate equivalent (25.4-101.6cm)	Not specified
Clay content (0-50.8cm)	Not specified
Electrical conductivity (25.4-101.6cm)	0–3 mmhos/cm
Sodium adsorption ratio (25.4-101.6cm)	Not specified
Soil reaction (1:1 water) (25.4-101.6cm)	4–7.8
Subsurface fragment volume <=3" (0-152.4cm)	0–3%
Subsurface fragment volume >3" (0-152.4cm)	Not specified

Ecological dynamics

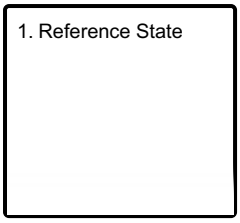
Water table influences

Frequent ponding (greater than 50 times in 100 years) occurs for long to very long durations of time (between 7 and 30 days or more). When ponding occurs, the water is commonly 6 to 10 inches above the soil surface. These hydric soils are interpreted as very poorly to poorly drained. Due to the depth and persistence of the water table, wetland indicator plants are commonly observed in the reference state.

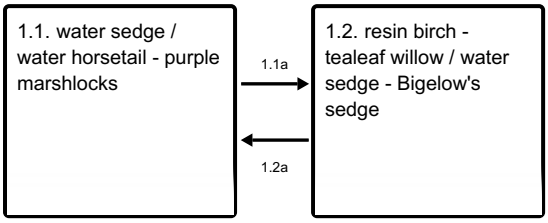
These terrace depressions support two separate plant communities. A sedge dominant community occurs in the center or deepest portion of these depressions. These communities pond frequently for very long durations of time. An open scrub community dominated by willow and birch occurs on the depression edge or in shallower portions of these depressions. These communities pond less frequently and for shorter durations of time.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - Soil pond less frequently, for shorter durations of time, and high-water table occurs at greater depths below the soil surface.

1.2a - Soil pond more frequently, for longer durations of time, and high-water table occurs closer to the soil surface.

State 1
Reference State

Figure 8. A sedge depression on a stream terrace in the area.

The reference state has two associated plant communities largely controlled by the influences of ponding and a water table. Community 1.1 typically occurs in the center of the depression, while community 1.2 typically occurs on the edges of the depression. When compared to the depression edge, the center of the depression has wetter soils that pond more frequently and have more abundant graminoid cover.

Dominant plant species

- water sedge (*Carex aquatilis*), grass
- water horsetail (*Equisetum fluviatile*), other herbaceous
- purple marshlocks (*Comarum palustre*), other herbaceous

Community 1.1
water sedge / water horsetail - purple marshlocks

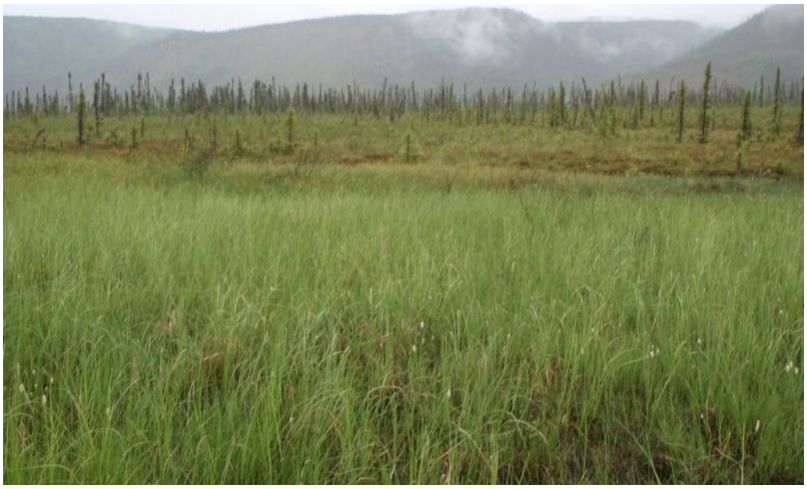


Figure 9. A typical plant community associated with community 1.1.

Reference community 1.1 is characterized as wet graminoid herbaceous (Viereck et al. 1992) with the dominant species being water sedge. The reference community has a much higher percentage of sedge cover as compared to community 1.2. Other commonly observed species are bog rosemary, leatherleaf, tealeaf willow, bluejoint, cottongrass, water horsetail, purple marshlocks, buckbean, and Sphagnum. The soil surface is primarily covered with herbaceous litter and bryophytes but extensive ponding was observed (as much as 100 percent of the plot). The vegetative strata that characterize this community phase are tall graminoids (greater than 2 feet in height), medium graminoids (between 4 inches and 2 feet), and moss.

Dominant plant species

- bog rosemary (*Andromeda polifolia*), shrub
- leatherleaf (*Chamaedaphne calyculata*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- dwarf birch (*Betula nana*), shrub
- water sedge (*Carex aquatilis*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- cottongrass (*Eriophorum*), grass
- water horsetail (*Equisetum fluviatile*), other herbaceous
- purple marshlocks (*Comarum palustre*), other herbaceous
- buckbean (*Menyanthes trifoliata*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Community 1.2
resin birch - tealeaf willow / water sedge - Bigelow's sedge

Figure 10. A typical plant community associated with community 1.2.

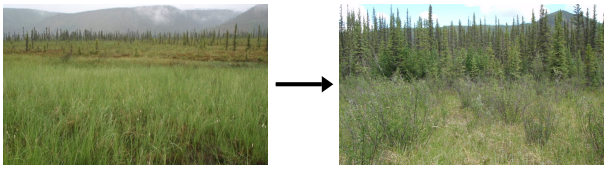
Community 1.2 occurs on the depression edge or in shallower portions of these depressions. This community is characterized as open low scrub (Viereck et al. 1992) with resin birch and tealeaf willow as the dominant shrubs.

Black spruce seedlings are common but have minimal cover. Other commonly observed species include water sedge, Bigelow's sedge, bluejoint, water horsetail, purple marshlocks, Sphagnum, and Aulacomnium moss. The vegetative strata that characterize this community are medium shrubs (between 3 and 10 feet), medium graminoids (between 4 and 24 inches), and moss.

Dominant plant species

- resin birch (*Betula glandulosa*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- water sedge (*Carex aquatilis*), grass
- Bigelow's sedge (*Carex bigelowii*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- water horsetail (*Equisetum fluviatile*), other herbaceous
- purple marshlocks (*Comarum palustre*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous
- aulacomnium moss (*Aulacomnium palustre*), other herbaceous

Pathway 1.1a
Community 1.1 to 1.2

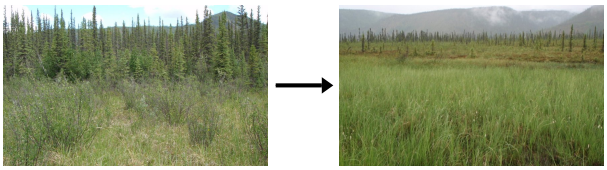


water sedge / water horsetail - purple marshlocks

resin birch - tealeaf willow / water sedge - Bigelow's sedge

If site conditions become drier, the duration of ponding and length of the growing season with a persistent water table decreases. These conditions favor community 1.2.

Pathway 1.2a
Community 1.2 to 1.1



resin birch - tealeaf willow / water sedge - Bigelow's sedge

water sedge / water horsetail - purple marshlocks

If site conditions become wetter, then the duration of ponding and length of the growing season with a persistent water table increases. These conditions favor plant community 1.1.

Additional community tables

Table 7. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
water sedge	CAAQ	*Carex aquatilis*	Native	–	25–90
tall cottongrass	ERAN6	*Eriophorum angustifolium*	Native	–	0–45
bluejoint	CACA4	*Calamagrostis canadensis*	Native	–	0–5
Forb/Herb					
water horsetail	EQFL	*Equisetum fluviatile*	Native	–	0–55
buckbean	METR3	*Menyanthes trifoliata*	Native	–	0–10
purple marshlocks	COPA28	*Comarum palustre*	Native	–	0–7
Shrub/Subshrub					
bog rosemary	ANPO	*Andromeda polifolia*	Native	–	0–10
tealeaf willow	SAPU15	*Salix pulchra*	Native	–	0–10
leatherleaf	CHCA2	*Chamaedaphne calyculata*	Native	–	0–5
Nonvascular					
sphagnum	SPHAG2	*Sphagnum*	Native	–	0–60

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
08CS01802, 09NP01602, 09TC03503, 10NP01401, 11BB03803, 2016AK290403, 2016AK290705, 2016AK290729

Community 1.2
10NP00201, 10NP01404

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Approval

Kirt Walstad, 2/13/2024

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	11/14/2024
Approved by	Kirt Walstad
Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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

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

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

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

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

    Dominant:

    Sub-dominant:

Other:

Additional:

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

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

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

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
