USDA Natural Resources Conservation Service

Ecological site XA232X01Y262
Boreal Woodland Gravelly Terraces

Last updated: 5/18/2020
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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): 232X–Yukon Flats Lowlands

The Yukon Flats Lowlands MLRA is an expansive basin characterized by numerous levels of flood plains and terraces that are separated by minimal breaks in elevation. This MLRA is in Interior Alaska and is adjacent to the middle reaches of the Yukon River. Numerous tributaries of the Yukon River are within the Yukon Flats Lowlands MLRA. The largest are Beaver Creek, Birch Creek, Black River, Chandalar River, Christian River, Dall River, Hadweenzic River, Hodzana River, Porcupine River, and Sheenjek River. The MLRA has two distinct LRU—lowlands and marginal uplands. The lowlands have minimal local relief and are approximately 9,000 square miles in size (Williams 1962). Landforms associated with the lowlands are flood plains and stream terraces. The marginal uplands consist of rolling and dissected plains that are a transitional area between the lowlands and adjacent mountain systems. The marginal uplands are approximately 4,700 square miles in size (Williams 1962).

This MLRA is bounded by the Yukon-Tanana Plateau to the south, Hodzana Highlands to the west, Porcupine Plateau to the east, and southern foothills of the Brooks Range to the north (Williams 1962). These surrounding hills and mountains partially isolate the Yukon Flats Lowlands MLRA from weather systems affecting other MLRAs of Interior Alaska. As a result, temperatures are generally warmer in summer and colder in winter than is characteristic in other areas at comparable latitude. There is a moisture and temperature gradient in which the lowlands region tends to be drier and colder and the surrounding marginal uplands region tends to be moister and warmer (PRISM Climate Group 2006).

The Yukon Flats Lowlands MLRA is mostly undeveloped lands that are sparsely populated and not accessible by a road system. A number of villages, including Beaver, Birch Creek, Chalkyitsik, Circle, Fort Yukon, Stevens Village, and Venetie, are adjacent to the Yukon River or one of its major tributaries. The largest village is Fort Yukon, which according to the 2010 U.S. Census has 583 residents that are dominantly Gwich'in Alaska Natives.

LRU notes

Alaska has no officially recognized LRU. However, there appear to be two distinct LRU in the Yukon Flats Lowlands MLRA. These LRU are thought to have differing climatic regimes, landforms, and soil types (STATSGO and Jorgensen and Meidinger 2015). The two LRU were previously discussed in the MLRA notes section above and are termed the lowlands LRU and the marginal uplands LRU.

This ecological site is associated with the lowlands LRU.

Classification relationships

Yukon Flats Lowlands MLRA.

Ecological site concept

This ecological site is associated with wet soils on the tread of gravelly stream terraces in the Yukon Flats Lowlands MLRA. Gravelly horizons range from very shallow to shallow depths (0 to 20 inches) and soils lack permafrost at depth. The pH of soil horizons commonly range from neutral to moderately alkaline, which leads to diverse species assemblages. The reference state supports multiple plant communities related to a fire regime.

Reference plant community 1.1 is characterized as a needleleaf woodland (10 to 25 percent cover; Viereck et al. 1992) composed primarily of black spruce (Picea mariana) and white spruce (Picea glauca). Commonly observed understory species include willow (Salix spp.), entireleaf mountain avens (Dryas integrifolia), red fruit bearberry (Arctostaphylos rubra), lingonberry (Vaccinium vitis-idaea), bog Labrador tea (*Ledum groenlandicum*), dwarf scouringrush (Equisetum scirpoides), reindeer lichen (Cladina spp.), stairstep moss (Hylocomium splendens), Tomentypnum moss (Tomentypnum nitens), and Aulacomnium moss (Aulacomnium palustre).

Associated sites

XA232X01Y250	**Boreal Woodland Gravelly Terraces Dry** This ecological site is associated with somewhat excessively drained soils on the tread of gravelly stream terraces in Yukon Flats Lowlands MLRA. Gravelly horizons occur at very shallow depth (0 to 10 inches). The reference plant community is characterized as a needleleaf woodland (10 to 25 percent cover; Viereck et al. 1992) composed primarily of mature white spruce (Picea glauca).
XA232X01Y221	**Boreal Forest Loamy Terraces** This ecological site is associated with moderately well to well drained soils on the tread of stream terraces in the Yukon Flats Lowlands MLRA. Flooding frequency ranges from rare to none. The reference plant community is characterized as an open needleleaf forest (25 to 60 percent cover) primarily composed of mature white spruce (Picea glauca).
XA232X01Y219	**Boreal Forest Loamy Terraces Moist** This ecological site is associated with somewhat poorly to moderately well drained soils on the treads of stream terraces in the Yukon Flats Lowlands MLRA. Flooding frequency ranges from rare to none and soils do not pond. The reference plant community is characterized as an open needleleaf forest (25 to 60 percent cover) primarily composed of mature white spruce (Picea glauca).
XA232X01Y212	**Boreal Sedge Peat Terrace Depressions** This ecological site is associated with drainageways on stream terraces in the lowlands region of the Yukon Flats Lowlands MLRA. Associated drainageways are very poorly drained with a water table that remains above the soil surface for the entire growing season. The reference plant community phase is characterized as subarctic lowland sedge wet meadow (Viereck et al. 1992) and is composed primarily of water sedge (Carex aquatilis).
XA232X01Y222	**Boreal Graminoid Loamy Terrace Depressions** This ecological site is associated with closed depressions of stream terraces that support a reference state with multiple graminoid-dominant community phases. These depressions are considered closed because they are not associated with a flood regime and have limited, if any, groundwater flow or recharge. The presumed hydrological inputs for this ecological site are primarily thaw of the annual active soil layer and/or permafrost, snowmelt runoff, and precipitation. This hydrologic regime results in the development of sodic soil properties.
XA232X01Y223	**Boreal Scrub Loamy Frozen Terrace Depressions** This shrubby ecological site occurs in the transitional area between the forested tread of a stream terrace and the graminoid-dominant communities associated with closed, terrace depressions (ecological site R232XY222AK). This site typically occurs between the outer third and lip of these closed depressions. The reference plant community for ecological site is characterized as an open tall scrubland (Viereck et al. 1992) and those shrubs are primarily an assortment of willow (Salix spp.).
XA232X01Y229	**Boreal Scrub Loamy Terrace Swales** This ecological site is associated with swales on stream terraces in lowlands region of the Yukon Flats Lowlands MLRA. Associated soils are considered very poorly drained. The reference plant community is characterized as open tall scrub (Viereck et al. 1992) and the dominant shrubs are willow (Salix spp.) and shrub birch (Betula glandulosa).

Similar sites

XA232X01Y201	**Boreal Woodland Peat Frozen Terraces** XA232X01Y201 is associated with acidic bogs. Associated soils are organic-rich where the cumulative thickness of organic material often exceeds 50 inches. While plant community assemblages are similar, Sphagnum moss is much more abundant in plant communities associated with XA232X01Y201.
XA232X01Y218	**Boreal Woodland Loamy Frozen Terraces** XA232X01Y218 lacks gravelly horizons from very shallow to shallow depths (0 to 20 inches). The associated loamy and wet soils allow for the aggradation of permafrost within the soil profile. Soils associated with XA232X01Y218 tend to have lower pH (moderately acidic to neutral) and less diverse assemblages of vascular and nonvascular species.

Table 1. Dominant plant species

Tree	(1) *Picea mariana* (2) *Picea glauca*
Shrub	(1) *Dryas integrifolia* (2) *Arctostaphylos rubra*
Herbaceous	(1) *Cladina* (2) *Tomentypnum nitens*

Legacy ID

F232XY262AK

Physiographic features

This ecological site is associated with gravelly stream terraces which primarily occur north of the Yukon River in this MLRA. Current or previously glacial fed rivers that flow out of the southern foothills of the Brooks Range created large gravelly stream terraces north of the Yukon River (e.g. Sheenjek, Christian, and Chandalar Rivers). The soils on these terraces tend to have sandy and gravelly substrata. These coarsely textured soils are unfavorable for permafrost aggradation in the profile. Nonglacial rivers, like those that flow out of the Yukon-Tanana Plateau (e.g., Birch and Beaver Creeks), are associated with stream terraces that have loamy substrata. These loamy soils are generally favorable for permafrost aggradation and these stream terraces support a different suite of ecological sites.

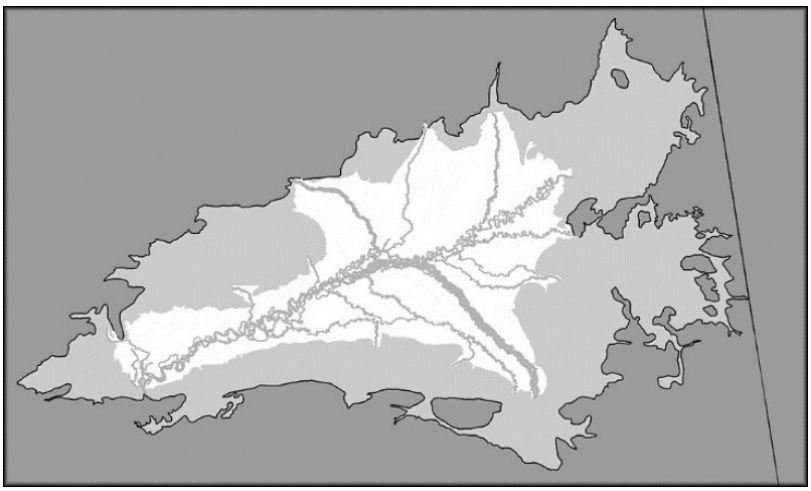


Figure 1. Lowlands region (white) and marginal uplands region (light gray) of the Yukon Flats Lowlands MLRA.

Table 2. Representative physiographic features

Geomorphic position, terraces	(1) Tread
Landforms	(1) Alluvial plain > Stream terrace (2) Alluvial plain > Stream terrace (3) Alluvial plain > Depression

Flooding frequency	None
Ponding frequency	None to rare
Elevation	91–305 m
Slope	0–3%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Short, warm summers and long, very cold winters characterize the subarctic continental climate of the area. The surrounding hills and mountains of this MLRA partially isolate it from weather systems affecting other interior lowlands. As a result, temperatures are generally warmer in summer and colder in winter than is characteristic in other areas of comparable latitude. The average annual temperature ranges from about 20 to 25 degrees F (-7 to -4 degrees C). The freeze-free period averages 70 to 120 days. The temperature usually remains above freezing from early June through late August. The average annual precipitation ranges from about 6 inches (150 millimeters) in the central basin to 15 inches (380 millimeters) along the boundary with the surrounding highlands. The maximum precipitation occurs in late summer, mainly as a result of thunderstorms. The average annual snowfall is about 45 to 55 inches (115 to 140 centimeters) (USDA, NRCS 2006).

All of the tabular data below was calculated from the PRISM dataset (1971-2000) and is specific to the Lowlands LRU in the Yukon Flats Lowlands MLRA.

Table 3. Representative climatic features

Frost-free period (characteristic range)	45-97 days
Freeze-free period (characteristic range)	70-120 days
Precipitation total (characteristic range)	203-330 mm
Frost-free period (average)	75 days
Freeze-free period (average)	
Precipitation total (average)	254 mm

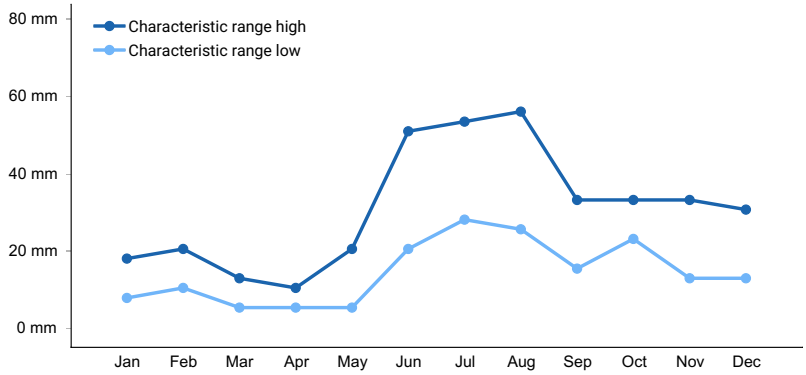


Figure 2. Monthly precipitation range

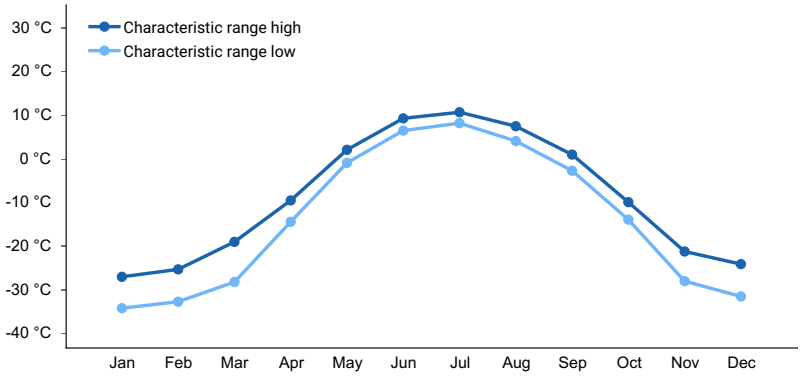


Figure 3. Monthly minimum temperature range

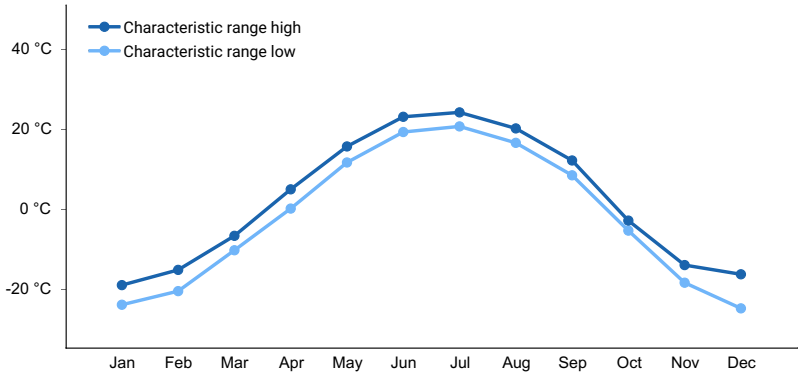


Figure 4. Monthly maximum temperature range

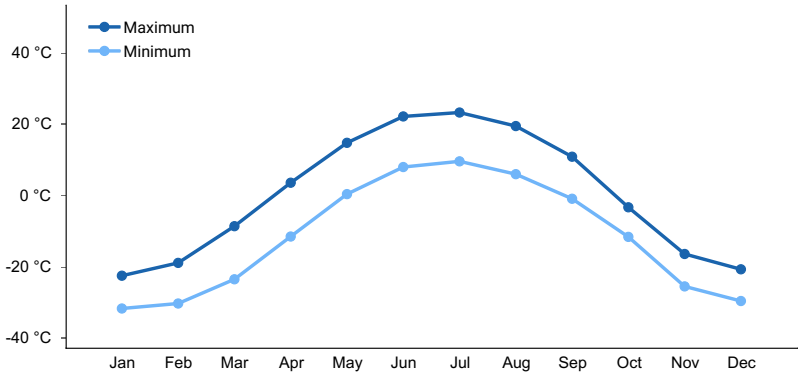


Figure 5. Monthly average minimum and maximum temperature

Influencing water features

During the spring and early growing season (May and June), a perched water table is over the seasonal frost in the soil profile, resulting in wet soils at very shallow to shallow depths (less than 20 inches). As the seasonal frost melts, the water drains from these soils. For the rest of the growing season, a water table typically occurs at moderate depths (20 to 40 inches) in the soil profile. The typical depth to the water table was determined through field observations.

White spruce are more productive when growing in well-drained soils in this MLRA. The water table associated with this ecological site decreases white spruce productivity and increases the presence of wetland indicator species.

Soil features

Correlated soil components for the Yukon Flats Area, Alaska soil survey (AK685): Kocacho; Scaup.

The depth of gravelly horizons and influences of a water table are important site factors that differentiate ecological sites on these gravelly stream terraces. Soils with gravelly horizons near the soil surface tend to be associated with woodlands (e.g. XA232X01Y250 and XA232X01Y262), while soils with deeper gravelly horizons tend to be

associated with forests (e.g., XA232X01Y219 and XA232X01Y221). This ecological site has gravelly horizons ranging from very shallow (0 to 10 inches, Kocacho soils) to shallow depths (10 to 20 inches, Scaup soils). While ecological site XA232X01Y250 also has gravelly horizons at very shallow depths (Venetie soils), soils are much drier. Ecological site XA232X01Y250 is associated with somewhat excessively drained soils while this ecological site is associated with poorly to somewhat poorly drained soils.

Figure 6. Typical soil profile of Scaup soil component. Gravelly horizons occur a shallow depths and a water table fluctuates between shallow to moderate depths for extensive periods of the growing season.

Table 4. Representative soil features

Parent material	(1) Organic material (2) Alluvium
Family particle size	(1) Sandy-skeletal (2) Coarse-silty over sandy or sandy-skeletal
Drainage class	Poorly drained to somewhat poorly drained
Soil depth	203 cm

Ecological dynamics

Fire

In the Yukon Flats Lowlands MLRA, fire is a common and natural event that has a significant control on the vegetation dynamics across the landscape. A typical fire event in areas associated with this ecological site will reset plant succession and alter dynamic soil properties (e.g., organic matter thickness). For this ecological site to progress from the early fire stage to the reference plant community, data suggest that 100 years or more must elapse without another fire event.

When comparing all MLRAs of Interior Alaska, land in the Yukon Flats Lowlands MLRA burns most frequently (Begét et al. 2006). Within the Yukon Flats Lowlands MLRA, fire is considered to be a natural and common event that typically goes unmanaged. Fire suppression generally occurs adjacent to villages or on allotments with known structures, both of which have a relatively limited acre footprint. From 2000 to 2015, 132 known fire events occurred on land in the Yukon Flats Lowlands MLRA and the burn perimeters of the fires totaled about 4.1 million acres (AICC 2016). Fire-related disturbances are highly patchy and can leave large undisturbed areas within the burn perimeters. Ten fires were attributed to human activities (affecting a total of 2,864 acres), but the majority of the fires were caused by lightning strikes (AICC 2016).

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 this area 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. From field observations and because the

associated soils are cooler and poorly drained, the typical fire scenario for this ecological site is considered to result in a low-severity burn.

In areas prone to low-severity fire events, the pre-fire vegetative community generally reestablishes quickly and there is minimal long-term alteration to community composition (Johnstone et al. 2010; Bernhardt et al. 2011). When minimal proportions of the organic mat are consumed, many species regenerate asexually using below ground root tissues. Species known to regenerate after low-severity fire events include various graminoids (e.g. Carex spp. and Eriophorum spp.), forbs (e.g. Equisetum sp.), and shrubs (e.g. *Ledum groenlandicum*, *Vaccinium uliginosum*, Salix sp.) (Johnstone et al. 2010). Black spruce is the Interior Alaska tree species best adapted to a low-severity fire regime. Black spruce have semi-serotenous cones and a low-severity fire often results in a flush of black spruce seedlings at the burned location.

Field data suggest that each of the woodland community phase burn and that fire events will cause a transition to the early stage of fire succession. This stage (community 1.3) is a mix of species that either regenerate in place (e.g., subterranean root crowns for willow and rhizomes for graminoids) and/or from wind-dispersed seeds or spores (e.g., resin birch [*Betula neoalaskana*] and Polytrichum moss [Polytrichum spp.]). The early stage of fire succession is primarily composed of tree seedlings, ericaceous shrubs, forbs, graminoids, and weedy bryophytes. In the absence of fire, tree seedlings continue to colonize and grow in recently burned areas until they become dominant in the overstory. The later stages of succession have an overstory that is a mix of immature broadleaf and/or needleleaf trees (community 1.2) or is primarily a mixed age needleleaf stand (community 1.1).

Given the high frequency of fire and its associated footprint, much of the land in the Yukon Flats Lowlands MLRA has burned too recently to support the reference plant community. GIS data and flight reconnaissance have shown that large swaths of mature spruce stands are uncommon throughout the MLRA. Mixed and open broadleaf forests have the greatest spatial representation in the Yukon Flats Lowlands MLRA.

Flooding

While conducting fieldwork, little if any evidence of flood-related disturbance was observed. Thus, no flood-related community phases were developed for this ecological site. A flood event in areas associated with this ecological site likely has limited energy, depositing alluvium on the soil surface but causing minimal alterations to overall composition of the plant community.

Other Observations

For this ecological site, the time of season that a burn occurs is likely a critical factor in determining the severity of a fire event. Associated soils are wet before and during the early portion of the growing season and eventually drain as the growing season progresses. If a fire event occurs later when soils are drier, then areas associated with this ecological site are expected to experience a high-severity burn. Future research may result in determining unique and currently unknown plant communities that result from high-severity burns.

Animal use (browsing and grazing) of this ecological site primarily consists of moose browse on willow and tree regeneration. Severity of moose browse is considered slight for all communities. A browse severity rating of slight on willow and tree regeneration is defined as a majority of individuals having no signs of browsing.

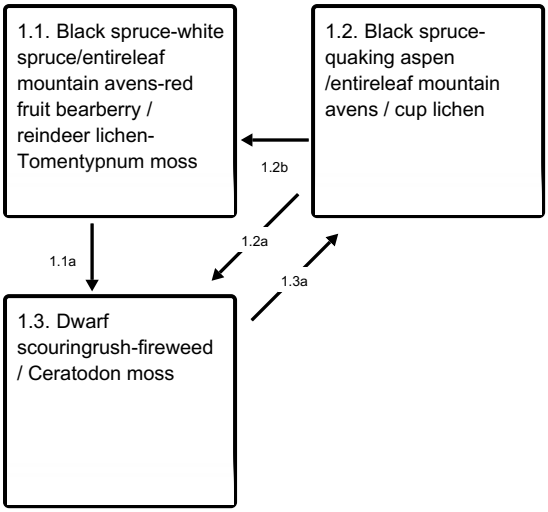
No alternative states for this ecological site were documented.

State and transition model

Ecosystem states

1. Reference

State 1 submodel, plant communities



State 1
Reference

Figure 7. Aerial image of a stream terrace in the Yukon Flats Lowlands MLRA. This ecological site occurs on stream terraces in this MLRA.

The reference state has three associated plant communities. The communities are grouped by the structure and dominance of the vegetation (e.g., coniferous trees, deciduous trees, shrubs, and forbs) and their ecological function and stability. Plant communities in the reference state appear to be largely controlled by the influences of fire. This report provides baseline vegetation inventory data for the ecological site. More data collection is needed to provide further information about existing plant communities and the disturbance regimes that would result in transitions from one community to another. The common and scientific plant names are from the USDA PLANTS database. All plant communities in this report are characterized using the Alaska Vegetation Classification (Viereck et al. 1992).

Community 1.1
Black spruce-white spruce/entireleaf mountain avens-red fruit bearberry / reindeer lichen-Tomentypnum moss

Figure 8. Typical plant community associated with community 1.1.

Community Phase 1.1 Canopy Cover Table

Vegetation data is aggregated from all sample plots for this community phase. The data is provided as frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species. Canopy cover is represented as a mean with the range in parentheses.

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
T	black spruce	*Picea mariana*	PIMA	88	15 (0-45)
T	white spruce	*Picea glauca*	PIGL	75	7 (0-20)
S	willow	*Salix spp.*	SALIX	100	4 (0.1-20)
S	red fruit bearberry	*Arctostaphylos rubra*	ARRU	94	10 (0-50)
S	entireleaf mountain avens	*Dryas integrifolia*	DRIN4	94	6 (0-30)
S	lingonberry	*Vaccinium vitis-idaea*	VAVI	88	5 (0-30)
S	bog Labrador tea	*Ledum groenlandicum*	LEGR	81	8 (0-40)
S	bog blueberry	*Vaccinium uliginosum*	VAUL	81	9 (0-45)
S	black crowberry	*Empetrum nigrum*	EMNI	69	6 (0-25)
G	sedge	*Carex spp.*	CAREX	62	5 (0-35)
F	dwarf scouringrush	*Equisetum scirpoides*	EQSC	88	7 (0-40)
L	reindeer lichen	*Cladina spp.*	CLADI3	81	25 (0-80)
B	splendid feathermoss	*Hylocomium splendens*	HYSP70	62	7 (0-45)
B	*Tomentypnum* moss	*Tomentypnum nitens*	TONI70	50	15 (0-55)
B	*Aulacomnium* moss	*Aulacomnium palustre*	AUPA70	50	5 (0-25)

This dataset includes data from 16 sample plots. The plots are distributed across the survey area and are independent of one another.

Values for tall, medium, regenerative, and stunted tree strata are used to calculate mean canopy cover and range values. Regenerative trees are not considered part of the overstory canopy.

Plant functional group classifications—T = trees, S = shrubs, G = graminoids, F = forbs, B = bryophytes, L = lichens

Canopy cover data is rounded, except trace (0.1 percent) cover. Data ranging from 1 to 9 percent cover is rounded to the nearest integer. Data ranging from 10 to 100 percent cover is rounded to the nearest factor of 5.

Figure 9. Canopy cover table for community 1.1.

The reference plant community is characterized as a needleleaf woodland (10 to 25 percent cover) composed of white spruce and black spruce. Tree age was highly variable, which is likely due to patchy low-intensity fire events. Tree cover is primarily split between the stunted (less than 15 feet in height) and medium tree strata (between 15 and 40 feet in height). The soil surface is covered primarily with bryophytes and lichen. High soil pH results in diverse understory species assemblages. Commonly observed understory species include a mixture of willow (primarily S. glauca), entireleaf mountain avens, red fruit bearberry, lingonberry, bog Labrador tea, dwarf scouringrush, a mixture of reindeer lichen (primarily C. rangiferina and C. stellaris), stairstep moss, Tomentypnum moss, and Aulacomnium moss. Some high pH indicator species, while neither common nor abundant, were *Cypripedium passerinum*, *Gentianella propinqua*, *Hedysarum alpinum*, *Lupinus arcticus*, *Rhododendron lapponicum*, and Tofieldia spp. The understory vegetative strata that characterize this community are bryophytes, dwarf shrubs (less than 8 inches in height), and foliose and fruticose lichens. Black spruce and white spruce trees were sampled for diameter at breast height (dbh), height, and age at dbh (33 black spruce and 16 white spruce). The basal area of the stand was determined for each sample plot. The mean dbh of black spruce is 3.1 inches (ranging from 1.7 to 9.1), the mean height is 18 feet (ranging from 8 to 33 feet), and the mean age is 126 years

(ranging from 11 to 248 years). The mean dbh of white spruce is 4.2 inches (ranging from 1.3 to 7.7 inches), the mean height is 19 feet (ranging from 6 to 26 feet), and the mean age is 150 years (ranging from 80 to 302 years). The mean basal area of the stands is 51 (ranging from 13 to 80). Site index of white spruce was determined for 8 of the sample plots; mean site index is 16 (ranging from 12 to 22) (Farr 1967).

Dominant plant species

- black spruce (*Picea mariana*), tree
- white spruce (*Picea glauca*), tree
- grayleaf willow (*Salix glauca*), shrub
- willow (*Salix*), shrub
- red fruit bearberry (*Arctostaphylos rubra*), shrub
- entireleaf mountain-avens (*Dryas integrifolia*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- bog Labrador tea (*Ledum groenlandicum*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- Lapland rosebay (*Rhododendron lapponicum*), shrub
- sedge (*Carex*), grass
- dwarf scouringrush (*Equisetum scirpoides*), other herbaceous
- reindeer lichen (*Cladina*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- tomentypnum moss (*Tomentypnum nitens*), other herbaceous
- aulacomnium moss (*Aulacomnium palustre*), other herbaceous
- sparrowegg lady's slipper (*Cypripedium passerinum*), other herbaceous
- fourpart dwarf gentian (*Gentianella propinqua*), other herbaceous
- alpine sweetvetch (*Hedysarum alpinum*), other herbaceous
- arctic lupine (*Lupinus arcticus*), other herbaceous
- tofieldia (*Tofieldia*), other herbaceous

Community 1.2
Black spruce-quaking aspen /entireleaf mountain avens / cup lichen

Figure 10. Typical plant community associated with community 1.2.

Community Phase 1.2 Canopy Cover Table

Vegetation data is aggregated from all sample plots for this community phase. The data is provided as frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species. Canopy cover is represented as a mean with the range in parentheses.

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
T	black spruce	*Picea mariana*	PIMA	100	20 (2-35)
T	white spruce	*Picea glauca*	PIGL	100	6 (4-8)
T	quaking aspen	*Populus tremuloides*	POTR5	50	15 (0-30)
T	resin birch	*Betula neoalaskana*	BENE4	50	2 (0-3)
S	kinnikinnick	*Arctostaphylos uva-ursi*	ARUV	100	5 (5-5)
S	entireleaf mountain avens	*Dryas integrifolia*	DRIN4	100	8 (0.1-15)
S	lingonberry	*Vaccinium vitis-idaea*	VAVI	100	3 (0.1-5)
S	bog Labrador tea	*Ledum groenlandicum*	LEGR	100	2 (0.1-3)
S	grayleaf willow	*Salix glauca*	SAGL	100	2 (1-2)
F	false toadflax	*Geocaulon lividum*	GELI2	100	5 (0.1-10)
F	dwarf scouringrush	*Equisetum scirpoides*	EQSC	50	0.1 (0-0.1)
L	cup lichen	*Cladonia spp.*	CLADO3	100	25 (6-45)
L	reindeer lichen	*Cladina spp.*	CLADI3	100	3 (1-5)

This dataset includes data from two sample plots. The plots are distributed across the survey area and are independent of one another.

Values for tall, medium, regenerative, and stunted tree strata are used to calculate mean canopy cover and range values. Regenerative trees are not considered part of the overstory canopy.

Plant functional group classifications—T = trees, S = shrubs, G = graminoids, F = forbs, B = bryophytes, L = lichens

Canopy cover data is rounded, except trace (0.1 percent) cover. Data ranging from 1 to 9 percent cover is rounded to the nearest integer. Data ranging from 10 to 100 percent cover is rounded to the nearest factor of 5.

Figure 11. Canopy cover table for community 1.2.

Community 1.2 is in the late stage of fire-induced secondary succession for this ecological site. It is characterized as a mixed woodland (Viereck et al. 1992) that is composed of immature spruce and deciduous trees. Tree cover is split between the tree regeneration (less than 15 feet in height) and medium tree stratums (between 15 and 40 feet in height). The soil surface is covered with a mixture of herbaceous litter, woody debris, and lichen. Commonly observed understory species include a mixture of willow (primarily S. glauca), entireleaf mountain avens, lingonberry, bog Labrador tea, a mixture of reindeer lichen, and a mixture of cup lichen (Cladonia spp.). The understory vegetative strata that characterize this community are dwarf shrubs (less than 8 inches in height) and foliose and fruticose lichens. Black spruce and white spruce trees were sampled for diameter at breast height (dbh), height, and age at dbh (4 black spruce and 2 white spruce). The basal area of the stand was determined for each sample plot. The mean dbh of black spruce is 2.2 inches (ranging from 1.0 to 3.0), the mean height is 13 feet (ranging from 8 to 18 feet), and the mean age is 58 years (ranging from 18 to 135 years). The mean dbh of white spruce is 4.7 inches (ranging from 1.7 to 7.7 inches), the mean height is 22 feet (ranging from 10 to 33 feet), and the mean age is 95 years (ranging from 40 to 150 years). The mean basal area of the stands is 12 (ranging from 4 to 20).

Dominant plant species

- black spruce (*Picea mariana*), tree
- white spruce (*Picea glauca*), tree
- quaking aspen (*Populus tremuloides*), tree
- resin birch (*Betula neoalaskana*), tree
- kinnikinnick (*Arctostaphylos uva-ursi*), shrub
- entireleaf mountain-avens (*Dryas integrifolia*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- bog Labrador tea (*Ledum groenlandicum*), shrub
- grayleaf willow (*Salix glauca*), shrub
- false toadflax (*Geocaulon lividum*), other herbaceous
- dwarf scouringrush (*Equisetum scirpoides*), other herbaceous
- cup lichen (*Cladonia*), other herbaceous
- reindeer lichen (*Cladina*), other herbaceous

Community 1.3
Dwarf scouringrush-fireweed / Ceratodon moss

Figure 12. Typical plant community associated with community 1.3.

Community Phase 1.3 Canopy Cover Table

Vegetation data is aggregated from all sample plots for this community phase. The data is provided as frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species. Canopy cover is represented as a mean with the range in parentheses.

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
T	quaking aspen	*Populus tremuloides*	POTR5	100	3 (1-5)
T	white spruce	*Picea glauca*	PIGL	100	2 (1-2)
S	red fruit bearberry	*Arctostaphylos rubra*	ARRU	100	3 (1-5)
S	willow	*Salix spp.*	SALIX	100	4 (3-4)
S	shrubby cinquefoil	*Dasiphora fruticosa*	DAFR6	100	1 (1-1)
S	entireleaf mountain avens	*Dryas integrifolia*	DRIN4	100	1 (0.1-1)
G	reedgrass	*Calamagrostis spp.*	CALAM	100	10 (1-20)
F	dwarf scouringrush	*Equisetum scirpoides*	EQSC	100	40 (35-45)
F	fireweed	*Chamerion angustifolium*	CHAN9	100	25 (20-30)
F	alpine sweetvetch	*Hedysarum alpinum*	HEAL	100	2 (1-3)
F	bitter fleabane	*Erigeron acris*	ERAC2	100	1 (0.1-1)
B	Ceratodon moss	*Ceratodon purpureus*	CEPU12	100	50 (40-60)
B	*Marchantia polymorpha*	*Marchantia polymorpha*	MAPO16	100	3 (0.1-5)

This dataset includes data from two sample plots. The plots are distributed across the survey area and are independent of one another.

Plant functional group classifications—T = trees, S = shrubs, G = graminoids, F = forbs, B = bryophytes, L = lichens

Values for tall, medium, regenerative, and stunted tree strata are used to calculate mean canopy cover and range values. Regenerative trees are not considered part of the overstory canopy.

Canopy cover data is rounded, except trace (0.1 percent) cover. Data ranging from 1 to 9 percent cover is rounded to the nearest integer. Data ranging from 10 to 100 percent cover is rounded to the nearest factor of 5.

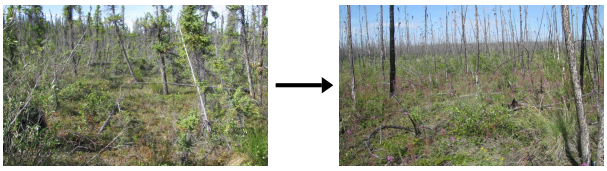
Figure 13. Canopy cover table for community 1.3.

Community 1.3 is in the early stage of fire-induced secondary succession for this ecological site. It is characterized as mesic forb herbaceous. Tree cover primarily is in the regenerative tree stratum (less than 15 feet in height). Tree seedlings, primarily quaking aspen and spruce, are commonly observed but not abundant. Although small areas of exposed bare soil occur, the soil surface is primarily covered with a mixture of weedy bryophyte species, woody debris, and herbaceous litter. Commonly observed species include a mixture of willow, reedgrass (Calamagrostis spp.), dwarf scouringrush, fireweed (*Chamerion angustifolium*), and Ceratodon moss (*Ceratodon purpureus*). The vegetative strata that characterize this community are bryophytes, medium forbs (between 4 and 24 inches in height), and dwarf forbs (less than 4 inches in height).

Dominant plant species

- quaking aspen (*Populus tremuloides*), tree
- white spruce (*Picea glauca*), tree
- red fruit bearberry (*Arctostaphylos rubra*), shrub
- grayleaf willow (*Salix glauca*), shrub
- willow (*Salix*), shrub
- shrubby cinquefoil (*Dasiphora fruticosa*), shrub
- entireleaf mountain-avens (*Dryas integrifolia*), shrub
- reedgrass (*Calamagrostis*), grass
- dwarf scouringrush (*Equisetum scirpoides*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous
- alpine sweetvetch (*Hedysarum alpinum*), other herbaceous
- bitter fleabane (*Erigeron acris*), other herbaceous
- ceratodon moss (*Ceratodon purpureus*), other herbaceous
- (*Marchantia polymorpha*), other herbaceous

Pathway 1.1a
Community 1.1 to 1.3



Black spruce-white spruce/entireleaf mountain avens-red fruit bearberry / reindeer lichen-Tomentypnum moss

Dwarf scouringrush-fireweed / Ceratodon moss

Fire.

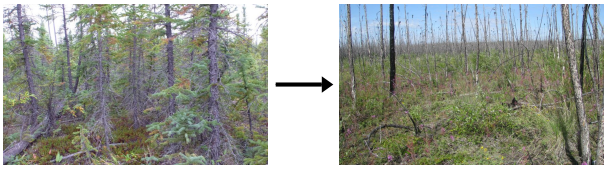
Pathway 1.2b
Community 1.2 to 1.1

Black spruce-quaking aspen /entireleaf mountain avens / cup lichen

Black spruce-white spruce/entireleaf mountain avens-red fruit bearberry / reindeer lichen-Tomentypnum moss

Time without fire.

Pathway 1.2a
Community 1.2 to 1.3



Black spruce-quaking aspen /entireleaf mountain avens / cup lichen

Dwarf scouringrush-fireweed / Ceratodon moss

Fire.

Pathway 1.3a
Community 1.3 to 1.2

Dwarf scouringrush-fireweed / Ceratodon moss

Black spruce-quaking aspen /entireleaf mountain avens / cup lichen

Time without fire.

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
black spruce	PIMA	*Picea mariana*	Native	2.4–10.1	0–45	4.3–23.1	–
white spruce	PIGL	*Picea glauca*	Native	1.8–7.9	0–20	3.3–19.6	–

Table 6. Community 1.2 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
black spruce	PIMA	*Picea mariana*	Native	2.4–5.5	2–35	2.5–7.6	–
white spruce	PIGL	*Picea glauca*	Native	3–10.1	4–8	4.3–19.6	–

Table 7. Community 1.3 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
quaking aspen	POTR5	*Populus tremuloides*	Native	0.3–4.6	1–5	–	–

Table 8. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
white spruce	*PIGL*	12	22	–	–	–	–	–	

Inventory data references

NASIS User Site ID / Modal Datasets
11SN02702 community 1.1
11TD08702 community 1.1
12NR01003 community 1.1
12NR01701 community 1.1
12NR02302 community 1.1
12TR00802 community 1.1
13BA00802 community 1.1
13BA01101 community 1.1
13BA01102 community 1.1
13NR01101 community 1.1
13NR01605 community 1.1
14AK2903098 community 1.1
14AK2903108 community 1.1
14NR02802 community 1.1

2015AK290991 community 1.1
S2013AK290002 community 1.1
12NR01103 community 1.2
14NR02803 community 1.2
12NR01703 community 1.3
12NR02301 community 1.3

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Contributors

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Approval

Michael Margo, 5/18/2020

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	05/11/2020
Approved by	Michael Margo
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:

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:**