USDA Natural Resources Conservation Service

Ecological site XA232X01Y204
Boreal Forest Loamy Flood Plain High

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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 regions—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 the high flood plain of major tributaries in the Yukon Flats Lowlands MLRA. In this MLRA, the flood plains of major tributaries have been divided into having low, middle, and/or high positions. When compared to low and middle flood plain, the high flood plain has less frequent and shorter duration flood events. Flooding occurs occasionally (5 to 50 times in 100 years) for brief durations of time (between 2 and 7 days). Associated soils are considered well drained. The reference state supports multiple communities related to flooding, fire, and tree throw.

Reference plant community 1.1 is characterized as an open needleleaf forest (25 to 60 percent cover) primarily composed of mature white spruce (Picea glauca). Commonly observed understory species include prickly rose (Rosa acicularis), squashberry (Viburnum edule), twinflower (Linnaea borealis), a mixture of alder species (Alnus spp.), a mixture of horsetail species (Equisetum spp.), tall bluebell (Mertensia paniculata), and splendid feathermoss (Hylocomium splendens).

Associated sites

XA232X01Y218	**Boreal Woodland Loamy Frozen Terraces** This ecological site is associated with wet soils on the tread of stream terraces in Yukon Flats Lowlands MLRA. Soils generally have permafrost at moderate depth (20 to 40 inches) and pond occasionally for long durations of time. The reference plant community is characterized as a needleleaf woodland (10 to 25 percent cover; Viereck et al. 1992) composed of black spruce (Picea mariana) and white spruce (Picea glauca).
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 plant communities. 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.
XA232X01Y219	**Boreal Forest Loamy Terraces Moist** This ecological site is associated with moderately well drained soils on the treads of stream terraces throughout 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).
XA232X01Y221	**Boreal Forest Loamy Terraces** This ecological site is associated with well drained soils on the treads of stream terraces throughout 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).
XA232X01Y280	**Boreal Scrub Loamy Flood Plain Wet** This ecological site is associated with the flood plain and adjacent terraces of minor, low-gradient tributaries in the Yukon Flats Lowlands MLRA. The reference plant community phase is associated with soils that both pond and flood. The reference plant community phase is characterized as closed tall scrub (greater than 75 percent shrub cover; Viereck et al. 1992) primarily composed of a mixture of willow (Salix spp.).
XA232X01Y205	**Boreal Grass Loamy Flood Plain Depressions** This ecological site is associated with depressions on flood plains in the Yukon Flats Lowlands MLRA. The reference state plant communities are associated with soils that both pond and flood. Ponding occurs frequently (greater than 50 times in 100 years) for long durations of time (between 7 and 30 days). Flooding occurs occasionally (5 to 50 times in 100 years) for brief durations of time (between 2 and 7 days). The reference plant community is characterized as mesic graminoid herbaceous (Viereck et al. 1992) and is primarily composed of bluejoint (Calamagrostis canadensis).
XA232X01Y206	**Boreal Scrub Loamy Frozen Flood Plain Depressions** This ecological site is associated with depressions on flood plains in the Yukon Flats Lowlands MLRA. The reference state plant communities are associated with soils that both pond and flood. Ponding occurs occasionally (5 to 50 times in 100 years) for brief durations of time (between 2 and 7 days). Flooding occurs occasionally for brief durations of time. The reference plant community is characterized as open tall scrub (Viereck et al. 1992) and is primarily composed of willow (Salix spp.).

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).
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.).
XA232X01Y209	**Boreal Tussock Loamy Frozen Terraces** This ecological site is associated with wet soils on the tread of terraces throughout the Yukon Flats Lowlands MLRA. Soils commonly have permafrost at moderate depth (20 to 40 inches) and lack gravelly horizons in the profile. Soils pond frequently for very long durations. The reference plant community is characterized as open low mixed shrub-sedge tussock bog (Viereck et al. 1992).
XA232X01Y200	**Boreal Scrub Loamy Flood Plain Low** Ecological site R232XY200AK is associated with the low flood plain of major tributaries in the Yukon Flats Lowlands MLRA. Flooding occurs frequently (greater than 50 times in 100 years) for long durations of time (between 7 and 30 days). The reference plant community is characterized as closed tall scrub (greater than 75 percent shrub cover; Viereck et al. 1992) primarily composed of a mixture of willow (Salix spp.) and alder (Alder spp.).
XA232X01Y202	**Boreal Forest Loamy Flood Plain Middle** This ecological site is associated with the middle flood plain of major tributaries in the Yukon Flats Lowlands MLRA. Flooding occurs occasionally (5 to 50 times in 100 years) for long durations of time (between 7 and 30 days). The reference plant community is characterized as a closed deciduous forest (60-100 percent cover; Viereck et al. 1992) primarily composed of mature balsam poplar (Populus balsamifera).

Similar sites

XA232X01Y202	**Boreal Forest Loamy Flood Plain Middle** XA232X01Y202 is associated with middle flood plains in the Lowlands LRU of the Yukon Flats Lowlands MLRA. When compared to XA232X01Y204, this ecological site floods more frequently and for longer durations of time. The reference state plant community is typically a closed stand of balsam poplar but can have productive white spruce trees.
XA232X01Y221	**Boreal Forest Loamy Terraces** XA232X01Y221 is associated with well drained soils on stream terraces in the Lowlands LRU of the Yukon Flats Lowlands MLRA. The flood frequency for this ecological site ranges from rare to none. Reference state communities are similar but XA232X01Y221 appears to have less productive stands of trees and typically has more non-vascular plant cover.
XA232X02Y210	**Boreal Forest Loamy Frozen Plains Warm** XA232X02Y210 is associated with well drained soils on slopes in the marginal uplands LRU of the Yukon Flats Lowlands MLRA. As compared to XA232X01Y204, white spruce trees associated with site XA232X02Y210 tend to grow smaller and have a lower site index.

Figure 1. A plant community sampled in a transitional area between a terrace and flood plain in the Yukon Flats Lowlands MLRA. In this transitional area, soils are undergoing the process of paludification. These plant communities are considered ecotones.

Table 1. Dominant plant species

Tree	(1) *Picea glauca*
Shrub	(1) *Rosa acicularis* (2) *Viburnum edule*
Herbaceous	(1) *Equisetum*

Legacy ID

F232XY204AK

Physiographic features

This ecological site and its associated communities occur throughout the Yukon Flats Lowlands MLRA. Given the large spatial extent, the site is associated with two soil components. The differences in site characteristics among these soils are discussed in this section.

Soils associated with rivers that are currently or have previously been glacially fed have different characteristics than those associated with nonglacial rivers. For instance, glacial rivers that flow out of the southern foothills of the Brooks Range (e.g. Sheenjek River) created large gravelly stream terraces north of the Yukon River. The soils on these terraces and adjacent flood plains tend to have sandy and gravelly substrata (Teedrinjik soils). These coarsely textured soils are unfavorable for permafrost aggradation in the profile. Nonglacial rivers that flow out of the Yukon-Tanana Plateau (e.g., Birch Creek) formed numerous terrace levels south of the Yukon River. The soils on these flood plain and terrace levels have a loamy substra that is generally favorable for permafrost aggradation (Kingslough soils).

Each soil type originally had a correspondingly unique ecological site. After more fieldwork and data analysis, it was determined that these wide-ranging soils all appear to support plant communities that respond similarly to fire, flooding, and have similar kinds and amounts of vegetation in the reference state. As a result, the soil components were all correlated into one ecological site.

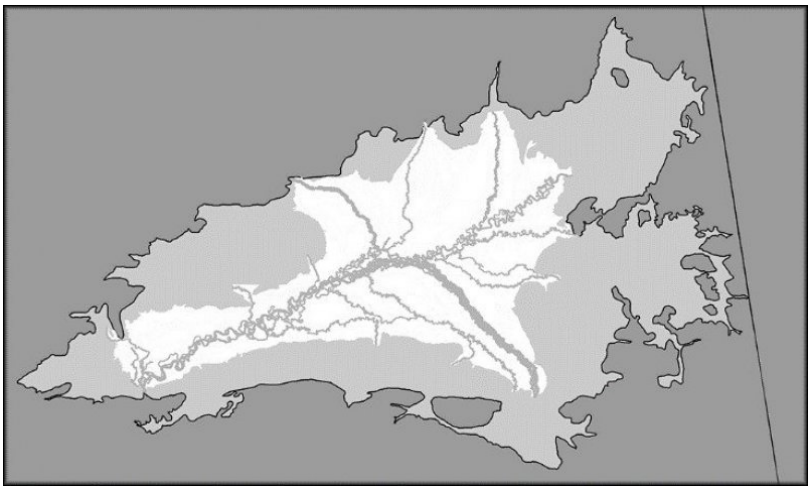


Figure 2. Lowlands (white) and marginal uplands (light gray) LRU of the Yukon Flats Lowlands MLRA.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Occasional
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

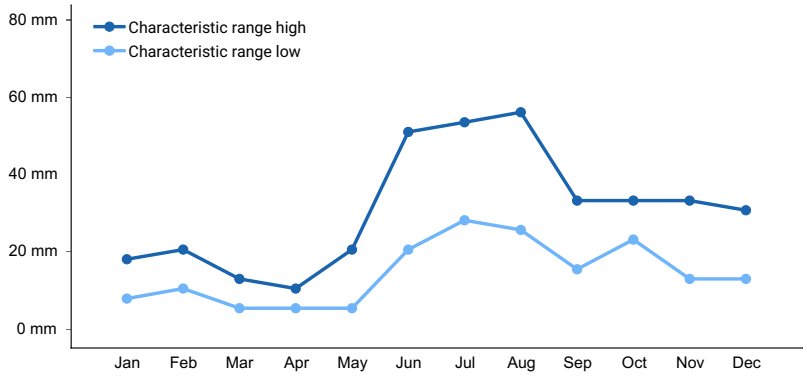


Figure 3. Monthly precipitation range

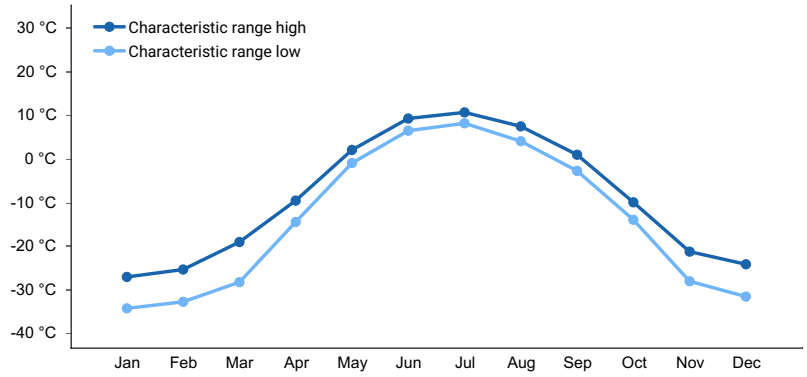


Figure 4. Monthly minimum temperature range

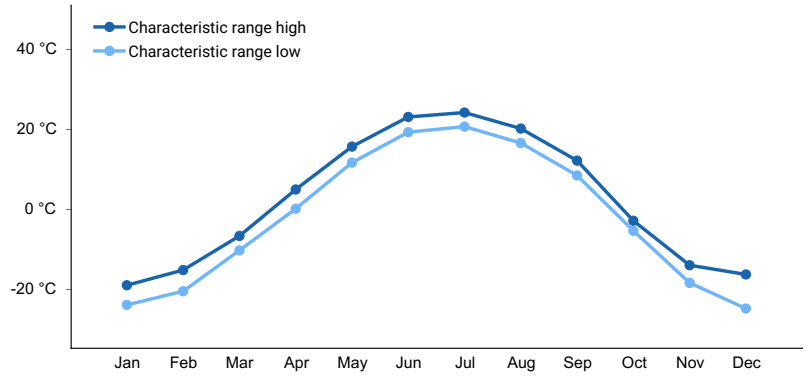


Figure 5. Monthly maximum temperature range

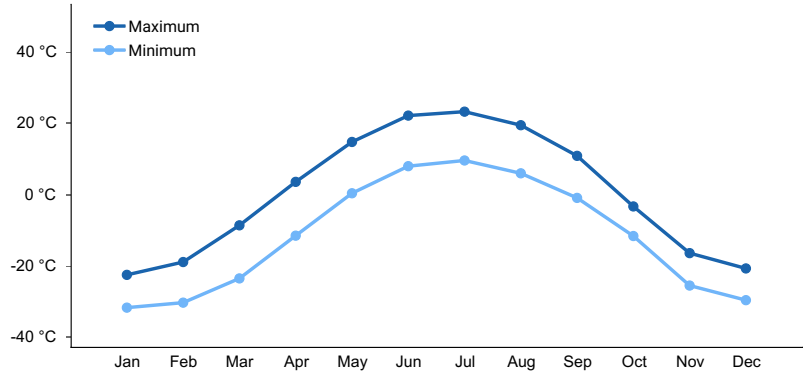


Figure 6. Monthly average minimum and maximum temperature

Influencing water features

Soil features

Correlated soil components for Yukon Flats Area, Alaska (AK685): Kingslough; Teedrinjik; Typic Cryorthents,

occasionally flooded.

Figure 7. Typical soil profile of Kingslough soil component.

Figure 8. Typical soil profile of Teedrinjik soil component.

Figure 9. Teedrinjik soils have coarse loamy soil over sandy or sandy-skeletal material. The picture shows this change occurring at approximately 70 cm in the soil profile.

Table 4. Representative soil features

Parent material	(1) Organic material (2) Alluvium
Family particle size	(1) Coarse-silty (2) Coarse-loamy over sandy or sandy-skeletal
Drainage class	Well drained

Soil depth	203 cm

Ecological dynamics

Flooding

All major tributaries within the Yukon Flats Lowlands have low, middle, and/or high flood plain ecological sites. These flood plain ecological sites represent major breaks in the flood regime (i.e. flood frequency and flood duration) and dominant vegetative type on associated tributaries. The low flood plain ecological site is thought to flood frequently (>50 times in 100 years) for long durations of time (7 to 30 days) and supports a willow (Salix spp.) dominant reference plant community. Middle flood plain positions are thought to flood occasionally for long durations of time and supports a balsam poplar (*Populus balsamifera*) dominant reference plant community. High flood plain positions are thought to flood occasionally for brief durations of time and supports a white spruce dominant reference plant community.

The shift of vegetative type from willow to white spruce dominance represents riparian primary succession along major tributaries in the Yukon Flats Lowlands MLRA. This successional process is thought to take between 200 and 300 years in Interior Alaska (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 certain sampled communities within the reference state flood more frequently than other communities. As flooding frequency increases, bryophyte cover decreases and balsam poplar, shrub, and woody debris cover increases. Given this observation, a more frequently flooded plant community was incorporated into the reference state (community 1.6). This community phase likely represents the transition in succession from the middle to high flood plain.

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 the plant succession and alter dynamic soil properties (e.g., presence or thickness of permafrost). For this ecological site to progress from the pioneering 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 this MLRA, fire is considered a natural and common event that typically is 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 perimeter of the fires totaled about 4.1 million acres (AICC 2016). Fire-related disturbances are highly patchy and can leave undisturbed areas within the burn perimeter. Ten of the fire events were attributed to human activities (affecting a total of 2,864 acres), but the majority 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 Interior Alaska is generally thought to be much more complex (Johnstone et al. 2008). Burn severity refers to the proportion of the vegetative canopy and organic material consumed in a fire event (Chapin et al. 2006). Fires in cool and moist habitat tend to result in low-severity burns, while fires in warm and dry habitat tend to result in high-severity burns. As a result of field observations and because the associated soils are warm and well drained, the typical fire scenario for this ecological site is considered to result in a high-severity burn.

Large portions of the organic mat are consumed during a high-severity fire event, commonly exposing pockets of mineral soil. The loss of this organic mat, which insulates the mineral soil, and the decrease in site albedo tends to cause overall soil temperatures to increase (Hinzman et al. 2006). In areas that have permafrost before a fire event, the increase in soil temperatures leads to a decrease in the depth to the permafrost or loss of permafrost in the soil

profile (Hinzman et al. 2006). For this ecological site, permafrost was typically not observed in the soil profiles after recent fire events and a soil component was developed for this change in dynamic soil properties (Typic Cryorthents, occasionally flooded soils). For soils that do not have a gravelly subsoil, data from fieldwork indicate that permafrost aggradation in the soil profile typically does not occur until community 1.2 and that permafrost is commonly associated with community 1.1 (Kingslough soils). Fire events also destroy a majority of the vascular and nonvascular biomass above ground.

Field data suggest that each of the forested communities will burn and that fire events will cause a transition to the pioneering stage of fire succession. This stage (community 1.5) is a mix of species that either regenerate in place (e.g., subterranean root crowns for willow and rhizomes for graminoids) and/or from wind-dispersed seed or spores that colonize exposed mineral soil (e.g., resin birch [*Betula neoalaskana*] and Ceratodon moss [*Ceratodon purpureus*]). The pioneering stage of fire succession is primarily composed of tree seedlings, forbs, grasses, and weedy bryophytes. Willow (Salix spp.) and deciduous tree seedlings continue to colonize and grow on recently burned sites until they become dominant in the overstory, which marks the transition to the early stage of fire succession (community 1.4). In the absence of fire, tree species continue to become more dominant in the stand. The later stages of succession have an overstory that is dominantly deciduous trees (community 1.3), a mix of broadleaf and needleleaf trees (community 1.2), or needleleaf trees (community 1.1).

The time elapsed since the most recent fire event plays a large role in determining the plant community observed in the field. Using data from the burn perimeter (AICC 2016) and tree age, the pioneering fire stage is thought to persist for up to 10 years post fire and the early fire community persists about 10 to 30 years postfire. After approximately 30 years, an open forest with some combination of resin birch and white spruce will persist until the next fire event. Field data suggest that broadleaf trees (primarily resin birch) are dominant in the canopy structure during the first 30 to 60 years post fire. During this timeframe, white spruce colonizes and matures in the understory. Eventually, white spruce gains dominance in the overstory and begins to replace the shade-intolerant broadleaf tree species. Late-fire community 1.2 has a mixture of immature and mature white spruce, while the reference community has a stand composed primarily of mature white spruce. The average age of white spruce in the reference plant community 1.1 is 127 years; therefore, it takes more than a century to progress from the pioneering stage to the reference community.

Other Observations

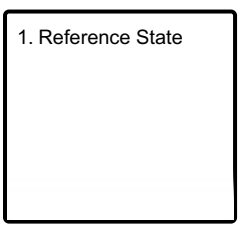
Animal use (browsing and grazing) of this ecological site primarily consists of moose browse on willow and tree regeneration, which was common in each community. Even though cover by willow and tree regeneration is highest in community 1.5 and 1.4, the severity of moose browse is considered slight for all reference state plant communities. A browse severity rating of slight on willow and tree regeneration is defined as a majority of individuals having no signs of browsing.

When flooding becomes rare, these high flood plain positions transition to terraces. Plant communities and soils sampled in these transitional areas are highly variable. For instance, some sampled flood plain soils appear to undergo paludification while others do not. Due to this variability, data gathered from transitional areas were excluded from the conceptual model for this ecological site.

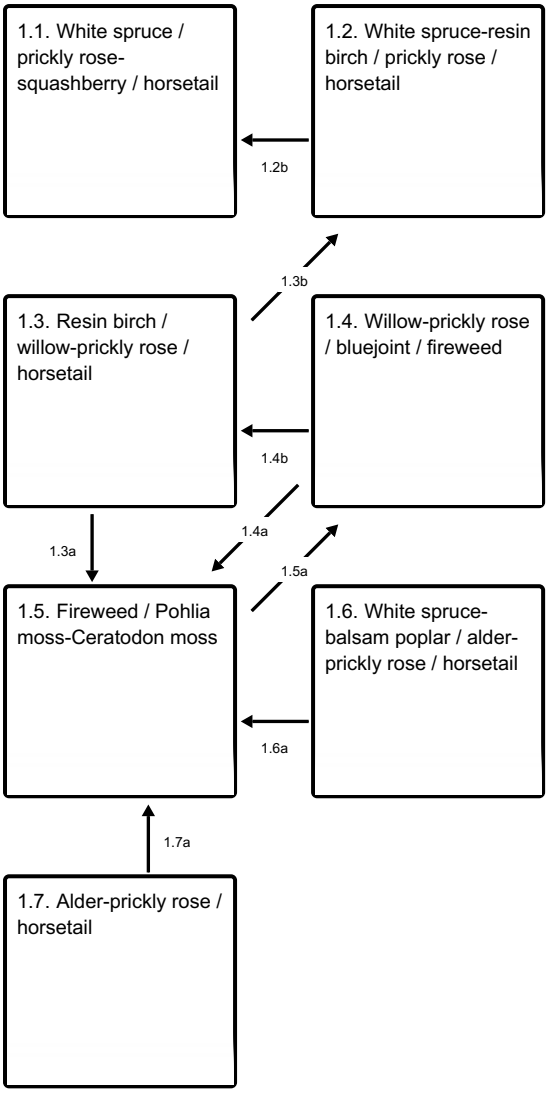
No alternative states for this ecological site were documented.

State and transition model

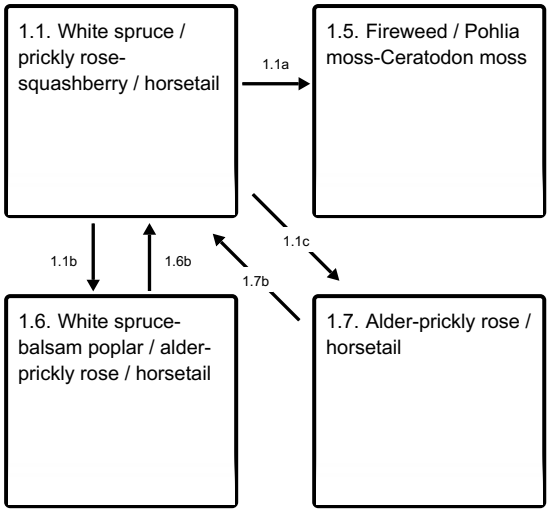
Ecosystem states



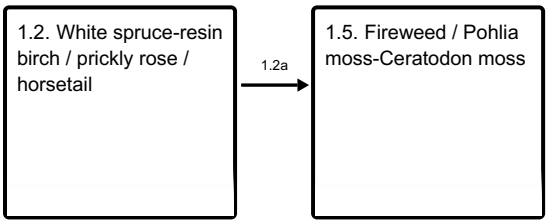
State 1 submodel, plant communities



Communities 1, 5, 6 and 7 (additional pathways)



Communities 2 and 5 (additional pathways)



State 1
Reference State

Figure 10. The Yukon River flood plain. This ecological site occurs on the flood plains of large tributaries in the Yukon Flats Lowlands MLRA.

The reference state has seven associated plant communities. These 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 flooding, fire, and tree throw. 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 or state to another. The common and scientific plant names are from the USDA PLANTS database. All community phases in this report are characterized using the Alaska Vegetation Classification (Viereck et al. 1992).

Community 1.1
White spruce / prickly rose-squashberry / horsetail

Figure 11. Typical plant community associated with community 1.1.

Community Phase 1.1 Canopy Cover Table

Vegetation information is provided as frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species for this community phase. 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	white spruce	*Picea glauca*	PIGL	100	55 (40-75)
S	prickly rose	*Rosa acicularis*	ROAC	100	20 (1-60)
S	squashberry	*Viburnum edule*	VIED	95	2 (0-15)
S	twinflower	*Linnaea borealis*	LIBO3	84	15 (0-70)
S	alder	*Alnus spp.*	ALNUS	63	8 (0-35)
S	russet buffaloberry	*Shepherdia canadensis*	SHCA	63	3 (0-15)
S	willow	*Salix spp.*	SALIX	58	5 (0-40)
S	redosier dogwood	*Cornus sericea*	COSE16	42	3 (0-35)
G	reedgrass	*Calamagrostis spp.*	CALAM	58	2 (0-20)
F	horsetail	*Equisetum spp.*	EQUIS	89	25 (0-90)
F	tall bluebells	*Mertensia paniculata*	MEPA	79	1 (0-5)
F	northern bedstraw	*Galium boreale*	GABO2	68	3 (0-25)
F	false toadflax	*Geocaulon lividum*	GELI2	42	2 (0-10)
B	stairstep moss	*Hylocomium splendens*	HYSP70	63	40 (0-85)
L	felt lichen	*Peltigera spp.*	PELTI2	47	1 (0-10)

This dataset comes from 19 sample plots. The plots occur 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, and 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 12. Canopy cover table for community 1.1.

Reference plant community 1.1 is characterized as an open needleleaf forest (25 to 60 percent cover) composed primarily of mature white spruce. The majority of the white spruce trees are similar in size and age, and the tree cover is primarily in the tall tree stratum (greater than 40 feet in height). Gaps occur in the tree canopy, but they are limited in size and extent and are likely the result of occasional windthrow. Live deciduous trees, primarily resin birch and balsam poplar (*Populus balsamifera*), occasionally occur in the tree canopy, but most have been replaced by white spruce. The soil surface is primarily covered with herbaceous litter, woody debris, and bryophytes. Commonly observed understory species include prickly rose, squashberry, twinflower, a mixture of alder species (most commonly *Alnus incana* ssp. tenuifolia), a mixture of horsetail species (most commonly *Equisetum arvense*), tall bluebell, and splendid feathermoss. The understory vegetative strata that characterize this community are bryophytes, medium forbs (4 to 24 inches in height), dwarf shrubs (less than 8 inches), and medium shrubs (between 3 and 10 feet). White spruce trees were sampled for diameter at breast height (dbh), height, and age at dbh (80 trees). The basal area of the stand and the site index were determined for each sample plot. The mean dbh is 11.0 inches (ranging from 7.5 to 25.0), the mean height is 71 feet (ranging from 45 to 98 feet), and the mean age is 127 years (ranging from 65 to 215 years). The mean basal area of the stands is 151 (ranging from 100 to 220), and mean site index is 66 (ranging from 49 to 84) (Farr 1967).

Forest overstory. Stand basal area: low 100, mean 151, high 220.

Dominant plant species

- white spruce (*Picea glauca*), tree
- prickly rose (*Rosa acicularis*), shrub
- squashberry (*Viburnum edule*), shrub
- twinflower (*Linnaea borealis*), shrub
- thinleaf alder (*Alnus incana ssp. tenuifolia*), shrub
- russet buffaloberry (*Shepherdia canadensis*), shrub
- willow (*Salix*), shrub
- redosier dogwood (*Cornus sericea*), shrub
- reedgrass (*Calamagrostis*), grass
- field horsetail (*Equisetum arvense*), other herbaceous

- marsh horsetail (*Equisetum palustre*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- tall bluebells (*Mertensia paniculata*), other herbaceous
- northern bedstraw (*Galium boreale*), other herbaceous
- false toadflax (*Geocaulon lividum*), other herbaceous
- felt lichen (*Peltigera*), other herbaceous

Community 1.2
White spruce-resin birch / prickly rose / horsetail

Figure 13. Typical plant community associated with community 1.2.

Community Phase 1.2 Canopy Cover Table

Vegetation information is provided as a frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species for this community phase. 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	white spruce	*Picea glauca*	PIGL	100	60 (35-80)
T	resin birch	*Betula neoalaskana*	BENE4	80	20 (0-60)
S	prickly rose	*Rosa acicularis*	ROAC	100	20 (5-50)
S	willow	*Salix spp.*	SALIX	90	30 (0-50)
S	russet buffaloberry	*Shepherdia canadensis*	SHCA	70	10 (0-30)
S	lingonberry	*Vaccinium vitis-idaea*	VAVI	60	4 (0-15)
S	twinflower	*Linnaea borealis*	LIBO3	50	9 (0-30)
S	alder	*Alnus spp.*	ALNUS	50	8 (0-40)
G	bluejoint	*Calamagrostis canadensis*	CACA4	60	5 (0-35)
F	horsetail	*Equisetum spp.*	EQUIS	90	15 (0-40)
F	wintergreen	*Pyrola spp.*	PYROL	60	6 (0-20)
B	stairstep moss	*Hylocomium splendens*	HYSP70	90	40 (0-60)
L	felt lichen	*Peltigera spp.*	PELTI2	70	3 (0-10)

This dataset includes data from ten 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, and 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.

Community pathway 1.2A
Fire.

Community pathway 1.2B
Time without fire. For more information, refer to the "Disturbance Dynamics" section.

Figure 14. Canopy cover table for community 1.2.

Plant community 1.2 is in the late stage of fire-induced secondary succession for this ecological site. It is characterized as an open mixed forest (25 to 60 percent cover) (fig.4). Deciduous trees, primarily mature resin birch, are starting to be replaced by white spruce in the tree canopy. White spruce cover is generally split between immature medium-sized trees (15 to 40 feet in height) and mature tall trees (greater than 40 feet in height). The soil

surface is primarily covered with herbaceous litter, woody debris, and bryophytes. Commonly observed understory species include prickly rose, a mixture of willow (most commonly *Salix bebbiana* and *Salix arbusculoides*), russet buffaloberry, a mixture of horsetail (most commonly *E. arvense* and *E. pratense*), russet buffaloberry (*Shepherdia canadensis*), stairstep moss, and felt lichen (Peltigera spp.). The understory vegetative strata that characterize this community are bryophytes, medium forbs (4 to 24 inches in height), low shrubs (between 8 and 36 inches), and tall shrubs (greater than 10 feet). White spruce trees were sampled for diameter at breast height (dbh), height, and age at dbh (32 trees). The basal area of the stand was determined for each sample plot. The mean dbh is 7.9 (ranging from 2.1 to 14.0), the mean height is 50 feet (ranging from 14 to 82 feet), and the mean age is 70 years (ranging from 30 to 175 years). The mean basal area is 97 (ranging from 52 to 200).

Dominant plant species

- white spruce (*Picea glauca*), tree
- resin birch (*Betula neoalaskana*), tree
- prickly rose (*Rosa acicularis*), shrub
- willow (*Salix*), shrub
- russet buffaloberry (*Shepherdia canadensis*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- twinflower (*Linnaea borealis*), shrub
- alder (*Alnus*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- field horsetail (*Equisetum arvense*), other herbaceous
- meadow horsetail (*Equisetum pratense*), other herbaceous
- wintergreen (*Pyrola*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- felt lichen (*Peltigera*), other herbaceous

Community 1.3
Resin birch / willow-prickly rose / horsetail

Figure 15. Typical plant community associated with community 1.3.

Community Phase 1.3 Canopy Cover Table

Vegetation information is provided as a frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species for this community phase. 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	resin birch	*Betula neoalaskana*	BENE4	100	50 (20-100)
T	white spruce	*Picea glauca*	PIGL	100	10 (0.1-45)
S	prickly rose	*Rosa acicularis*	ROAC	100	20 (1-45)
S	willow	*Salix spp.*	SALIX	100	20 (1-40)
S	twinflower	*Linnaea borealis*	LIBO3	56	5 (0-20)
F	fireweed	*Chamerion angustifolium*	CHAN9	78	7 (0-40)
F	horsetail	*Equisetum spp.*	EQUIS	67	15 (0-70)
F	tall bluebells	*Mertensia paniculata*	MEPA	56	2 (0-15)

This dataset includes data from nine 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, and 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 16. Canopy cover table for community 1.3.

Plant community 1.3 is in the middle stage of fire-induced secondary succession for this ecological site. It is characterized as an open broadleaf forest (25 to 60 percent cover) (fig. 5). Deciduous trees, primarily resin birch, are dominant in the tree canopy, and the majority of the tree cover is split between the medium tree (15 to 40 feet in height) and tall tree stratums (greater than 40 feet). Seedlings of white spruce are common throughout the understory. The forest floor is primarily covered with herbaceous litter and woody debris. Commonly observed understory species include prickly rose, a mixture of willow (most commonly *S. bebbiana* and *S. arbusculoides*), fireweed (*Chamerion angustifolium*), and a mixture of horsetail (most commonly *E. arvense* and *E. pratense*). The understory vegetative strata that characterize this community are medium forbs (4 to 24 inches in height), low shrubs (between 8 and 36 inches), and tall shrubs (greater than 10 feet). White spruce trees were sampled for diameter at breast height (dbh), height, and age at dbh (10 trees). The basal area of the stand was determined for each sample plot. The mean dbh is 5.1 (ranging from 1.8 to 9.8), the mean height is 34 feet (ranging from 11 to 62 feet), and the mean age is 39 years (ranging from 10 to 68 years). The mean basal area is 91 (ranging between 52 and 276).

Dominant plant species

- resin birch (*Betula neoalaskana*), tree
- white spruce (*Picea glauca*), tree
- prickly rose (*Rosa acicularis*), shrub
- willow (*Salix*), shrub
- twinflower (*Linnaea borealis*), shrub
- fireweed (*Chamerion angustifolium*), other herbaceous
- horsetail (*Equisetum*), other herbaceous
- tall bluebells (*Mertensia paniculata*), other herbaceous

Community 1.4
Willow-prickly rose / bluejoint / fireweed

Figure 17. Typical plant community associated with community 1.4.

Community Phase 1.4 Canopy Cover Table

Vegetation information is provided as a frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species for this community phase. 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	white spruce	*Picea glauca*	PIGL	100	15 (8-20)
T	resin birch	*Betula neoalaskana*	BENE4	40	6 (0-20)
S	willow	*Salix spp.*	SALIX	100	25 (10-50)
S	prickly rose	*Rosa acicularis*	ROAC	100	15 (0.1-25)
S	redosier dogwood	*Cornus sericea*	COSE16	100	4 (0.1-8)
S	russet buffaloberry	*Shepherdia canadensis*	SHCA	100	4 (1-10)
G	bluejoint	*Calamagrostis canadensis*	CACA4	100	10 (1-30)
G	Pumpelly's brome	*Bromus inermis* ssp. *pumpellianus*	BRINP5	60	4 (0-15)
F	fireweed	*Chamerion angustifolium*	CHAN9	100	7 (0.1-20)
F	horsetail	*Equisetum spp.*	EQUIS	80	7 (0-25)
F	tall bluebells	*Mertensia paniculata*	MEPA	80	1 (0-3)
L	felt lichen	*Peltigera spp.*	PELTI2	80	2 (0-10)

This dataset includes data from five 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, and 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 18. Canopy cover table for community 1.4.

Plant community 1.4 is in the early stage of fire-induced secondary succession for this ecological site. It is characterized as open tall scrubland and is primarily composed of a mixture of willow. White spruce and resin birch are common and cover primarily occurs in the regenerative tree stratum (less than 15 feet in height). The soil surface is primarily covered with herbaceous litter and woody debris. Commonly observed species include an assortment of willow (most commonly *S. bebbiana* and *S. arbusculoides*), prickly rose, redosier dogwood (*Cornus sericea*), russet buffaloberry, bluejoint (*Calamagrostis canadensis*), fireweed, and a mixture of horsetail (most commonly *E. arvense* and *E. pratense*). The understory vegetative strata that characterize this community are medium forbs (4 to 24 inches in height), low shrubs (between 8 and 36 inches), medium shrubs (between 3 and 10 feet), and tall shrubs (greater than 10 feet).

Dominant plant species

- white spruce (*Picea glauca*), tree
- resin birch (*Betula neoalaskana*), tree

- Bebb willow (*Salix bebbiana*), shrub
- littletree willow (*Salix arbusculoides*), shrub
- willow (*Salix*), shrub
- redosier dogwood (*Cornus sericea*), shrub
- prickly rose (*Rosa acicularis*), shrub
- Pumpelly's brome (*Bromus inermis ssp. pumpellianus var. pumpellianus*), grass
- fireweed (*Chamerion angustifolium*), other herbaceous
- field horsetail (*Equisetum arvense*), other herbaceous
- meadow horsetail (*Equisetum pratense*), other herbaceous
- tall bluebells (*Mertensia paniculata*), other herbaceous
- felt lichen (*Peltigera*), other herbaceous

Community 1.5
Fireweed / Pohlia moss-Ceratodon moss

Figure 19. Typical plant community associated with community 1.5.

Community Phase 1.5 Canopy Cover Table

Vegetation information is provided as a frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species for this community phase. 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)
S	prickly rose	*Rosa acicularis*	ROAC	80	10 (0-30)
S	willow	*Salix spp.*	SALIX	80	3 (0-8)
G	bluejoint	*Calamagrostis canadensis*	CACA4	100	5 (3-10)
G	Pumpelly's brome	*Bromus inermis* ssp. *pumpellianus*	BRINP5	60	10 (0-35)
F	fireweed	*Chamerion angustifolium*	CHAN9	100	35 (4-85)
F	shortray fleabane	*Erigeron lonchophyllus*	ERLO	60	4 (0-10)
F	horsetail	*Equisetum spp.*	EQUIS	40	15 (0-60)
B	*Pohlia* moss	*Pohlia nutans*	PONU70	60	25 (0-60)
B	*Ceratodon* moss	*Ceratodon purpureus*	CEPU12	20	10 (0-55)

This dataset includes data from five 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, and 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 20. Canopy cover table for community 1.5.

Plant community 1.5 is in the pioneering stage of fire-induced secondary succession for this ecological site. It is characterized as mesic forb herbaceous. Tree cover is sparse and primarily occurs in the regenerative tree stratum (less than 15 feet in height). 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 prickly rose, and assortment of willow (most commonly *S. bebbiana*), bluejoint, fireweed, Pohlia moss (*Pohlia nutans*), and Ceratodon moss (*Ceratodon purpureus*). The vegetative strata that characterize this community are bryophytes and medium forbs (4 to 24 inches in height).

Dominant plant species

- prickly rose (*Rosa acicularis*), shrub
- Bebb willow (*Salix bebbiana*), shrub
- willow (*Salix*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- Pumpelly's brome (*Bromus inermis ssp. pumpellianus var. pumpellianus*), grass
- fireweed (*Chamerion angustifolium*), other herbaceous
- shortray fleabane (*Erigeron lonchophyllus*), other herbaceous
- field horsetail (*Equisetum arvense*), other herbaceous
- meadow horsetail (*Equisetum pratense*), other herbaceous
- pohlia moss (*Pohlia nutans*), other herbaceous
- ceratodon moss (*Ceratodon purpureus*), other herbaceous

Community 1.6
White spruce-balsam poplar / alder-prickly rose / horsetail

Figure 21. Typical plant community associated with community 1.6.

Community Phase 1.6 Canopy Cover Table

Vegetation information is provided as a frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species for this community phase. 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	white spruce	*Picea glauca*	PIGL	100	40 (10-70)
T	balsam poplar	*Populus balsamifera*	POBA2	100	15 (5-30)
S	prickly rose	*Rosa acicularis*	ROAC	100	25 (3-80)
S	alder	*Alnus spp.*	ALNUS	100	20 (1-45)
S	willow	*Salix spp.*	SALIX	83	10 (0-45)
S	squashberry	*Viburnum edule*	VIED	67	20 (0-50)
S	twinflower	*Linnaea borealis*	LIBO3	50	4 (0-15)
S	russet buffaloberry	*Shepherdia canadensis*	SHCA	50	4 (0-10)
F	horsetail	*Equisetum spp.*	EQUIS	100	10 (1-35)
B	stairstep moss	*Hylocomium splendens*	HYSP70	50	8 (0-35)

This dataset includes data from six 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, and 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 22. Canopy cover table for community 1.6.

Plant community 1.6 is more frequently flooded then the reference community 1.1. It is characterized as an open mixed forest (25 to 60 percent cover). Deciduous trees, primarily mature balsam poplar, are starting to be replaced by white spruce in the tree canopy. White spruce cover is generally split between immature medium-sized trees (15 to 40 feet in height) and mature tall trees (greater than 40 feet in height). Although small areas with feathermoss occur, the soil surface is primarily covered with a mixture of woody debris and herbaceous litter. Commonly observed understory species include prickly rose, a mixture of alder (most commonly *Alnus incana* ssp. tenuifolia), a mixture of willow (most commonly *S. alaxensis* and *S. arbusculoides*), squashberry, and a mixture of horsetail (most commonly *E. arvense* and *E. pratense*). The understory vegetative strata that characterize this community are medium shrubs (3 to 10 feet in height), medium forbs (4 to 24 inches in height), and tall shrubs (greater than 10 feet). White spruce trees were sampled for diameter at breast height (dbh), height, and age at dbh (14 trees). The basal area of the stand was determined for each sample plot. The mean dbh is 10.9 (ranging from 6.7 to 21.1), the mean height is 58 feet (ranging from 32 to 86 feet), and the mean age is 73 years (ranging from 37 to 155 years). The mean basal is 93 (ranging from 62 to 112).

Dominant plant species

- white spruce (*Picea glauca*), tree
- balsam poplar (*Populus balsamifera*), tree
- prickly rose (*Rosa acicularis*), shrub
- thinleaf alder (*Alnus incana ssp. tenuifolia*), shrub
- Bebb willow (*Salix bebbiana*), shrub
- feltleaf willow (*Salix alaxensis*), shrub
- willow (*Salix*), shrub
- squashberry (*Viburnum edule*), shrub
- twinflower (*Linnaea borealis*), shrub
- russet buffaloberry (*Shepherdia canadensis*), shrub
- field horsetail (*Equisetum arvense*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous

Community 1.7
Alder-prickly rose / horsetail

Figure 23. Typical plant community associated with community 1.7.

Community Phase 1.7 Canopy Cover Table

Vegetation information is provided as a frequency (percent) and mean canopy cover (percent) of the most dominant and ecologically relevant species for this community phase. 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	white spruce	*Picea glauca*	PIGL	86	10 (0-35)
T	resin birch	*Betula neoalaskana*	BENE4	43	2 (0-5)
S	alder	*Alnus spp.*	ALNUS	100	60 (50-80)
S	prickly rose	*Rosa acicularis*	ROAC	100	25 (0.1-55)
S	willow	*Salix spp.*	SALIX	86	35 (0-85)
S	red currant	*Ribes triste*	RITR	86	10 (0-30)
S	squashberry	*Viburnum edule*	VIED	57	20 (0-45)
S	redosier dogwood	*Cornus sericea*	COSE16	43	15 (0-65)
S	twinflower	*Linnaea borealis*	LIBO3	43	5 (0-35)
S	American red raspberry	*Rubus idaeus*	RUID	43	4 (0-20)
F	horsetail	*Equisetum spp.*	EQUIS	100	40 (1-85)
F	bluntleaf sandwort	*Moehringia lateriflora*	MOLA6	43	5 (0-20)
F	arctic blackberry	*Rubus arcticus*	RUAR	43	4 (0-10)

This dataset includes data from seven 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, and 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 24. Canopy cover table for community 1.7.

Plant community 1.7 is in the early stage of tree throw-induced secondary succession for this ecological site. Mature white spruce are common but no longer abundant (generally less than 10% cover) and this phase is characterized as closed tall scrubland. Tree cover is split between the tall tree (greater than 40 feet) and the regenerative tree stratum (less than 15 feet in height). Although small areas with feathermoss occur, the soil surface is primarily covered with a mixture of woody debris and herbaceous litter. Commonly observed species include a mixture of alder (most commonly *A. viridis* spp. fruticosa), prickly rose, an assortment of willow (most commonly *S. bebbiana* and *S. arbusculoides*), red currant (*Ribes triste*), and a mixture of horsetail (most commonly *E. arvense* and *E. pratense*). The understory vegetative strata that characterize this community are tall shrubs (greater than 10 feet in height), medium shrubs (between 3 and 10 feet), and medium forbs (4 to 24 inches in height).

Dominant plant species

- white spruce (*Picea glauca*), tree
- resin birch (*Betula neoalaskana*), tree
- thinleaf alder (*Alnus incana ssp. tenuifolia*), shrub
- Siberian alder (*Alnus viridis ssp. fruticosa*), shrub
- prickly rose (*Rosa acicularis*), shrub
- Bebb willow (*Salix bebbiana*), shrub
- littletree willow (*Salix arbusculoides*), shrub
- willow (*Salix*), shrub
- red currant (*Ribes triste*), shrub
- squashberry (*Viburnum edule*), shrub
- redosier dogwood (*Cornus sericea*), shrub
- American red raspberry (*Rubus idaeus*), shrub
- field horsetail (*Equisetum arvense*), other herbaceous
- bluntleaf sandwort (*Moehringia lateriflora*), other herbaceous
- arctic raspberry (*Rubus arcticus*), other herbaceous

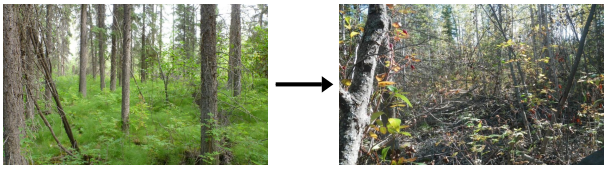
Pathway 1.1a
Community 1.1 to 1.5

White spruce / prickly rose-squashberry / horsetail

Fireweed / Pohlia moss-Ceratodon moss

Fire.

Pathway 1.1b
Community 1.1 to 1.6



White spruce / prickly rose-squashberry / horsetail

White spruce-balsam poplar / alder-prickly rose / horsetail

More frequent and longer duration flood events. The reference state for this ecological site floods occasionally for brief periods of time. 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 1.6. When compared to community 1.1, the more frequently flooded plant community (community 1.6) has less feathermoss cover and greater balsam poplar and shrub cover.

Pathway 1.1c
Community 1.1 to 1.7

White spruce / prickly rose-squashberry / horsetail

Alder-prickly rose / horsetail

In certain locations, extensive stand death of white spruce was observed. The reason for stand death remains unknown. Standing dead trees are eventually windthrown, which makes greater amounts of light available to understory vegetation. Under these circumstances, alder cover increases significantly.

Pathway 1.2b
Community 1.2 to 1.1

White spruce-resin birch / prickly rose / horsetail

White spruce / prickly rose-squashberry / horsetail

Time without fire. For more information, refer to the "ecological dynamics of the site" section.

Pathway 1.2a
Community 1.2 to 1.5

White spruce-resin birch / prickly rose / horsetail

Fireweed / Pohlia moss-Ceratodon moss

Fire.

Pathway 1.3b
Community 1.3 to 1.2

Resin birch / willow-prickly rose / horsetail

White spruce-resin birch / prickly rose / horsetail

Time without fire. For more information, refer to the "Ecological Dynamics of the Site" section.

Pathway 1.3a
Community 1.3 to 1.5

Resin birch / willow-prickly rose / horsetail

Fireweed / Pohlia moss-Ceratodon moss

Fire.

Pathway 1.4b
Community 1.4 to 1.3

Willow-prickly rose / bluejoint / fireweed

Resin birch / willow-prickly rose / horsetail

Time without fire. For more information, refer to the "Ecological Dynamics of the Site" section.

Pathway 1.4a
Community 1.4 to 1.5

Willow-prickly rose / bluejoint / fireweed

Fireweed / Pohlia moss-Ceratodon moss

Fire.

Pathway 1.5a
Community 1.5 to 1.4

Fireweed / Pohlia moss-Ceratodon moss

Willow-prickly rose / bluejoint / fireweed

Time without fire. For more information, refer to the "Ecological Dynamics of the Site" section.

Pathway 1.6b
Community 1.6 to 1.1

White spruce-balsam poplar / alder-prickly rose / horsetail

White spruce / prickly rose-squashberry / horsetail

Less frequent flooding. The reference state for this ecological site floods occasionally for brief periods of time. 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 1.6. When compared to community 1.1, the more frequently flooded plant community (community 1.6) has less feathermoss cover and greater balsam poplar and shrub cover.

Pathway 1.6a
Community 1.6 to 1.5

White spruce-balsam poplar / alder-prickly rose / horsetail

Fireweed / Pohlia moss-Ceratodon moss

Fire.

Pathway 1.7b
Community 1.7 to 1.1

Alder-prickly rose / horsetail

White spruce / prickly rose-squashberry / horsetail

Tree throw recovery. Seedlings of white spruce will continue to colonize and mature. The stand is thought to eventually revert back to conditions represented by reference plant community 1.1.

Pathway 1.7a
Community 1.7 to 1.5

Alder-prickly rose / horsetail

Fireweed / Pohlia moss-Ceratodon moss

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							
white spruce	PIGL	*Picea glauca*	Native	13.7–29.9	40–75	19.1–63.5	–

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							
white spruce	PIGL	*Picea glauca*	Native	4.3–25	35–80	5.3–35.6	–
resin birch	BENE4	*Betula neoalaskana*	Native	–	0–60	–	–

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							
resin birch	BENE4	*Betula neoalaskana*	Native	–	20–100	–	–
white spruce	PIGL	*Picea glauca*	Native	3.4–18.9	0.1–45	4.6–24.9	–

Table 8. Community 1.4 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
resin birch	BENE4	*Betula neoalaskana*	Native	–	0–22	–	–
white spruce	PIGL	*Picea glauca*	Native	–	8–20	–	–

Table 9. Community 1.6 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
white spruce	PIGL	*Picea glauca*	Native	9.8–26.2	10–70	17–53.6	–
balsam poplar	POBA2	*Populus balsamifera*	Native	–	5–30	–	–

Table 10. Community 1.7 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
white spruce	PIGL	*Picea glauca*	Native	–	0–35	–	–
resin birch	BENE4	*Betula neoalaskana*	Native	–	0–5	–	–

Table 11. 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*	49	82	–	–	–	–	–	

Inventory data references

NASIS User Site ID / Modal Datasets
10BB02601 plant community 1.1
10BB02805 plant community 1.1
10BB03304 plant community 1.1
10BB03701 plant community 1.1
11BB05703 plant community 1.1
12BB00701 plant community 1.1
12BB00806 plant community 1.1
12NR00503 plant community 1.1
12NR01205 plant community 1.1
12NR02303 plant community 1.1
12NR03104 plant community 1.1
12NR03202 plant community 1.1
12NR04603 plant community 1.1
12SN00601 plant community 1.1
12SS03101 plant community 1.1
12SS03201 plant community 1.1
13BA01601 plant community 1.1
13NR01304 plant community 1.1
S2012AK290001 plant community 1.1
08DM03606 plant community 1.2
08DM04004 plant community 1.2
08DM04302 plant community 1.2
08DM05004 plant community 1.2
08DM05402 plant community 1.2
08DM05901 plant community 1.2
10BL03502 plant community 1.2
11BB06703 plant community 1.2
11SN03101 plant community 1.2
2015AK290404 plant community 1.2
08DM05705 plant community 1.3

08DM06406 plant community 1.3
10BL00103 plant community 1.3
10BL01801 plant community 1.3
11BB06702 plant community 1.3
11TD09205 plant community 1.3
12NR00204 plant community 1.3
12NR00702 plant community 1.3
12NR03102 plant community 1.3
10BB02602 plant community 1.4
10BB03303 plant community 1.4
10BL04301 plant community 1.4
10BL04801 plant community 1.4
10BL04802 plant community 1.4
10BL00105 plant community 1.5
10BL00106 plant community 1.5
10BL04302 plant community 1.5
10BL04502 plant community 1.5
12NR00301 plant community 1.5
08DM08004 plant community 1.6
10BB02401 plant community 1.6
10BB03804 plant community 1.6
11TD09104 plant community 1.6
12NR00705 plant community 1.6
12NR04802 plant community 1.6
08DM03202 plant community 1.7
08DM04201 plant community 1.7
08DM04607 plant community 1.7
08DM07302 plant community 1.7
10BB02403 plant community 1.7
12BB00904 plant community 1.7
13BA01403 plant community 1.7

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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):**

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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:**
