USDA Natural Resources Conservation Service

Ecological site XA232X01Y222
Boreal Graminoid Loamy Terrace Depressions

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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 closed depressions of stream terraces that support a reference state with multiple graminoid-dominant 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 coupled with the areas parent material results in the development of sodic soil properties.

Sodic soils have electrical conductivity of less than 4 dS/m, pH of greater than 8.5, and exchangeable sodium percentage (ESP) greater than 15 (Ogle and John 2010). Since these depressions are closed, soil water is drawn upward through the soil during summer months via evapotranspiration. This causes accumulation of salts in the soil profile and is a feature commonly observed in arid or semi-arid basin soils of the continental United States. Salt compounds in the soils are calcite, dolomite, gypsum, halite, and trona (Clautice and Mowatt 1981). Certain plant species are better adapted to the physiological stress associated with sodic soils than others, which likely leads to the unique plant communities observed in the reference state for this ecological site.

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).
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. The reference plant community is characterized as an open needleleaf forest (25 to 60 percent cover) primarily composed 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 XA232X01Y222). 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).
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).
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).
XA232X01Y262	**Boreal Woodland Gravelly Terraces** This ecological site is associated with wet soils on the tread of gravelly stream terraces in the lowlands region of 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 plant community phase 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).

XA232X01Y209	**Boreal Tussock Loamy Frozen Terraces** This ecological site occurs on stream terraces in the lowlands region of the Yukon Flats Lowlands MLRA. Soils commonly have permafrost at moderate depth (20 to 40 inches) and pond frequently for very long durations. The reference plant community is characterized as open low mixed shrub-sedge tussock bog (Viereck et al. 1992).

Similar sites

XA232X01Y205	**Boreal Grass Loamy Flood Plain Depressions** Ecological site XA232X01Y205 supports a similar graminoid-dominant reference state and plant communities. XA232X01Y205 occurs in depressions of flood plains, is associated with a flood regime, and is associated with soils that do not have sodic parent materials. These differences in landform position, disturbance regime, and soil type result in similar, but unique, plant communities for each ecological site.

Figure 1. Aerial photograph of closed depressions in the Yukon Flats Lowlands. The outer third, or lip, of these depressions commonly supports willow dominant plant communities (XA232X01Y223).

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Calamagrostis stricta* (2) *Hordeum jubatum*

Legacy ID

R232XY222AK

Physiographic features

This ecological site and its associated plant communities commonly occur on old terraces. The Yukon Flats Lowlands MLRA is composed of broad and numerous terrace levels. Individual terrace levels commonly span several miles in all directions, but one level to the next can be separated by less than 25 feet in elevation. These terrace levels can be broadly segregated by age. Young terraces are generally proximal to active stream channels and have a recent or current association with a flood regime (rare flooding, 1 to 5 times in 100 years). While capped with organic material, soils on young terraces are primarily composed of alluvium. Flight or satellite reconnaissance of young terraces results in observance of readily identifiable stream landforms, which in the Yukon Flats Lowlands MLRA commonly include meander scrolls, abandoned channels, and oxbow lakes. Old terraces are generally distal from active stream channels and are disconnected from a flood regime. Soils on old terraces are generally composed of eolian deposits and/or loess underlain by alluvium (e.g. Yasuda soils). The depositional surface material commonly is thick enough to mask stream landforms like abandoned linear channels. From the air, the depressions appear to be circular to amorphous in shape (see figure below).

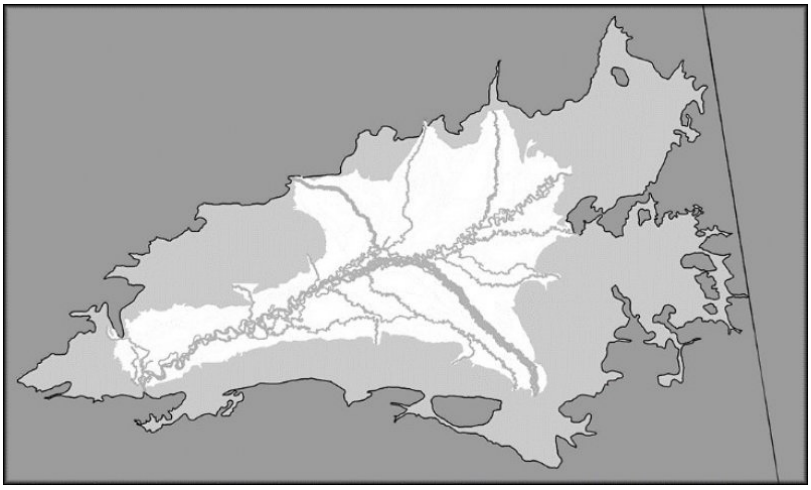


Figure 2. Lowlands (white) and marginal uplands (light grey) regions of the Yukon Flats Lowlands MLRA.

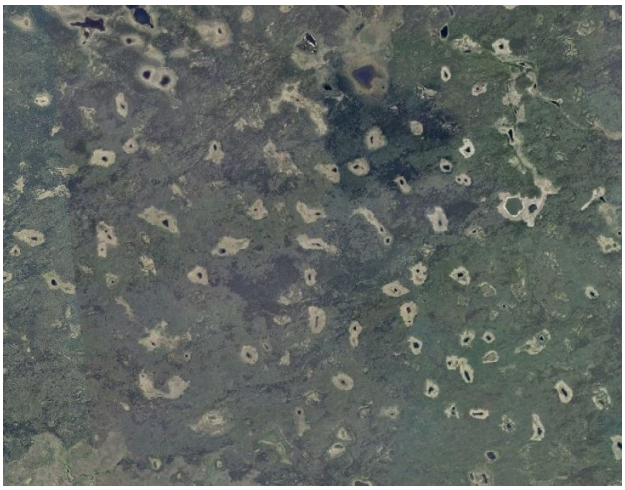


Figure 3. Satellite image of a stream terrace with circular to amorphous shaped depressions. The image is of a terrace adjacent to the Yukon River and Birch Creek in the Yukon Flats Lowlands MLRA.

Figure 4. Aerial photograph of a typical closed depression in the Yukon Flats Lowlands. The bare soil is a playette that is surrounded by various graminoid-dominant plant communities.

Table 2. Representative physiographic features

Geomorphic position, terraces	(1) Tread
Landforms	(1) Alluvial plain > Stream terrace > Closed depression
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)

Ponding frequency	Frequent
Elevation	91–259 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

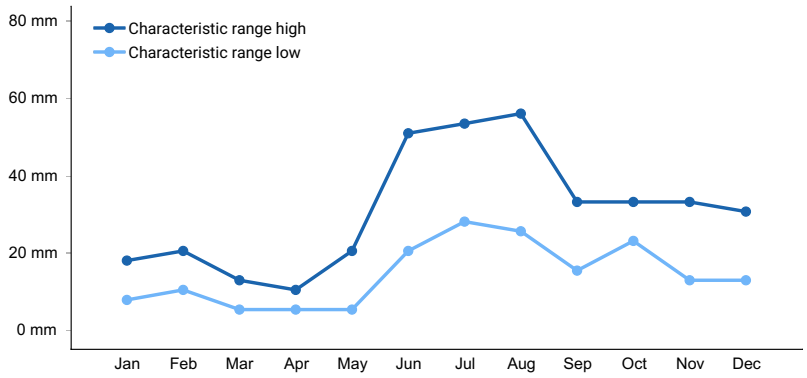


Figure 5. Monthly precipitation range

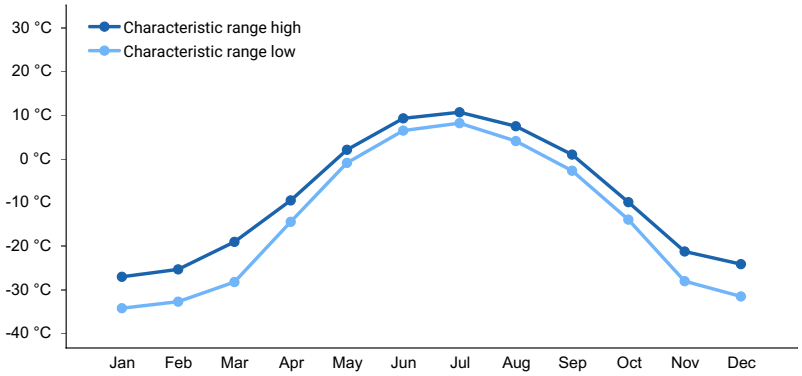


Figure 6. Monthly minimum temperature range

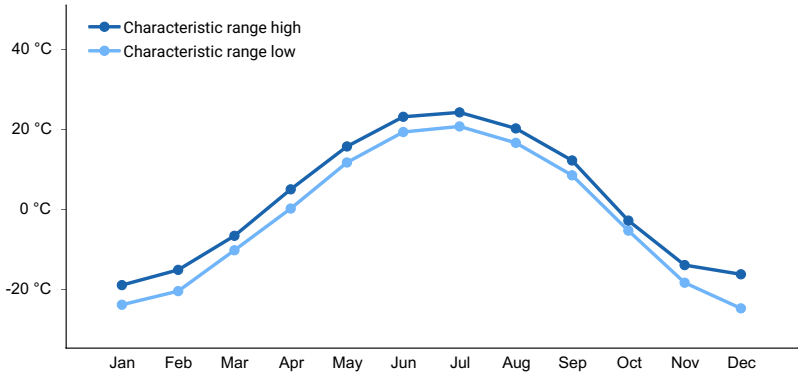


Figure 7. Monthly maximum temperature range

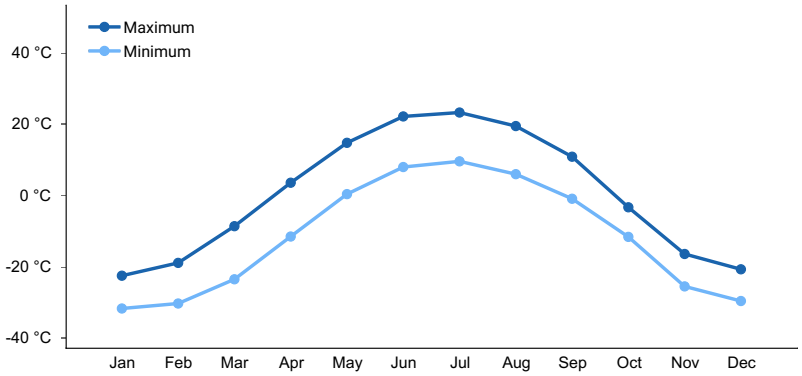


Figure 8. Monthly average minimum and maximum temperature

Influencing water features

During the early portion of the 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 depth (less than 10 inches). During this period of time, ponding occurs frequently. As the seasonal frost melts, the water drains from these soils. During long portions of the growing season, a water table commonly occurs at moderate depths (20 to 40 inches) in the soil profile.

The duration of both ponding and a high water table appear to largely control the plant communities observed in the reference state. Soil associated with the reference plant community (community 1.1) tend to have shorter duration ponding events when compared to other reference state plant communities (1.2 and 1.3). In addition, the reference plant community tends to have a water table at very shallow depth (0 to 10 inches) for shorter durations of time when compared to other reference state plant communities. Ponding duration and the typical depth to the water table was determined through field observation and by the presence of redoximorphic features that are common throughout the soil profile.

Figure 9. Aerial photograph of several depressions in the Yukon Flats Lowlands that have significant willow mortality. The mortality is thought to have occurred as a result of a rapid increase in the size of the waterbody in the depressions.

Soil features

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

Yasuda soil component is thought to be associated with community 1.1. Community 1.2 and 1.3 are associated with wetter soils with comparatively longer ponding durations. A specific soil component has not currently been developed for plant communities 1.2 and 1.3.

Figure 10. Typical soil profile associated with Yasuda soil component

Figure 11. Typical soil profile associated with Yasuda soil component

Table 4. Representative soil features

Parent material	(1) Alluvium
Family particle size	(1) Coarse-silty
Drainage class	Very poorly drained
Soil depth	203 cm
Sodium adsorption ratio (20.3-76.2cm)	1–10
Soil reaction (1:1 water) (20.3-76.2cm)	7.5–9

Ecological dynamics

Closed terrace depressions support two associated ecological sites (XA232X01Y222 and XA232X01Y223). The lowest portion of the depressions generally have a stagnant body of water and bare mineral soil with sparse patches of various obligate wetland species (e.g., common mare's-tail [*Hippuris vulgaris*]). Community 1.3 generally is directly adjacent to this waterbody, appearing to colonize the exposed mineral soil. It is considered an early ponding sere. Although highly variable in composition, common species include American sloughgrass (*Beckmannia syzigachne*), common rivergrass (*Scolochloa festucacea*), water sedge (*Carex aquatilis*), softstem bulrush (*Schoenoplectus tabernaemontani*), and water horsetail (*Equisetum fluviatile*). Community 1.3 has the longest ponding duration of the associated reference state plant communities and has a persistent water table in the soil profile throughout the growing season.

As elevation and distance from the waterbody increases, site conditions favor community 1.2 and reference community 1.1. Soils that remain ponded for shorter durations and have a less persistent water table support a highly diverse grass-dominant community (reference community 1.1). Soils that remain ponded for longer durations and have a more persistent water table support a sedge-dominant (Carex sp.) community (community 1.2). In lower microtopographical positions adjacent to these plant communities, sparsely vegetated salt-encrusted playas are common. Pursh seepweed (*Suaeda calceoliformis*) commonly is the only species present.

The outer third, or lip, of the closed depressions generally supports willow-dominant (Salix sp.) plant communities, which are associated with a unique ecological site (XA232X01Y223). When comparing the soils of ecological sites XA232X01Y222 and XA232X01Y223, those associated with ecological site XA232X01Y223 tend to be drier, pond less frequently, commonly have permafrost, have lower soil pH, and lack sodic materials. The spatial dominance of each ecological site is presumed to be dynamic within these closed depressions, and it might be controlled by regional climatic variables.

Climatic Influences

Since many of the hydrologic inputs are tied to local climate (e.g., precipitation), changes in climatic variables have a large impact on the associated water table and plant communities within these closed depressions of stream terraces. Extended years of low snowfall, warm annual temperatures, and low relative humidity have reduced the water table of closed depressions in the Yukon Flats as a result of large net evaporative losses (Anderson et al. 2013). Hence, extended years of warm and dry conditions likely shrink standing bodies of water and expose mineral soil in the depressions, decrease the frequency and duration of ponding, decrease the period of time a water table is within the soil profile, and possibly lead to tree and shrub colonization and community expansion (See ecological site XA232X01Y223.). The opposite likely occurs during extended years of colder and wetter conditions. Extended periods of warmer and drier conditions in the Yukon Flats may be due in part to large-scale climatic regimes, such as the Pacific decadal oscillation. For more information, refer to the publications by Hartmann and Weller (2005) and Anderson et al. (2013).

Fire

When comparing all MLRAs of Interior Alaska, the Yukon Flats Lowlands MLRA burns most frequently (Begét et al. 2006). Within this MLRA, fire is considered to be a common and natural event that typically is unmanaged. Efforts to suppress fire generally occur adjacent to villages or areas with known structures, both of which have relatively limited acreage. From 2000 to 2015, 132 known fire events occurred within the Yukon Flats Lowlands (MLRA 232)

and the burn perimeters of those fires totaled about 4.1 million acres (AICC 2016). Fire-related disturbance is highly patchy, however, and it can leave much of the area within the burn perimeter undisturbed. Ten fire events were attributed to human activities (affecting 2,864 acres), but the majority of the other fire events were caused by lightning strikes (AICC 2016). The intensity of fire events and the time elapsed between events plays a critical role in the distribution and abundance of vegetation in Interior Alaska (Chapin et al. 2006).

Grasslands in the Yukon Flats Lowlands commonly burn. This was determined through aerial reconnaissance and common observance of charcoal in the soil profile or on the soil surface. Fires consume the dry thatch that extensively covers the soil surface of grassland depressions; however, this fuel source is limited (generally less than 10 cm thick [personal observation]). It is presumed that a typical fire event moves across the depression quickly, burning for only a short period of time in an area.

While fire is a known disturbance regime, a fire event is not currently believed to result in unique plant communities. Four locations that were thought to have burned less than 10 years before the sampling date (AICC 2016) had no discernible differences in either plant community composition or abundance of common species as compared to unburned locations. The fire events likely destroy the aboveground biomass of graminoids, but individuals regenerate in place from subterranean rhizomes. A comparison of pre-fire communities to post-fire communities indicates negligible impacts on short-term community structure; however, fire may play a significant role in the long-term sustainability of the grassland communities. Fire may prevent shrub and tree colonization and community expansion into grassland depressions, but the importance of this relationship is currently unknown.

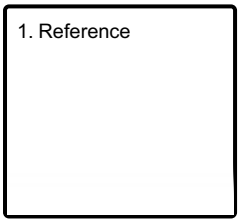
Other Observations

Some of these terrace depressions in the Yukon Flats Lowlands appear to be less susceptible to changes in water level than are others. Large lakes are throughout the Yukon Flats Lowlands, and changes in climate have had limited impact on the level of many of these lakes (Anderson et al. 2013). It is believed that the limited impact stems from the stable waterbodies having deep groundwater connectivity (Minsley et al. 2012; Anderson et al. 2013). Unique ecological sites were not developed for the plant communities adjacent to these stable lakes because the stable lake margins commonly were limited in size and the communities observed were similar to community 1.3.

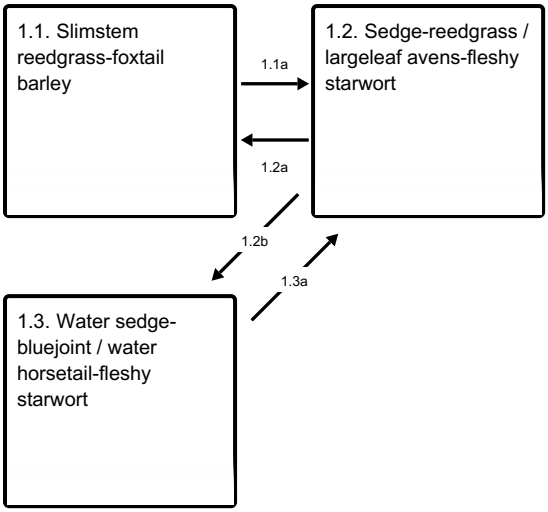
Animal use (browsing and grazing) of this ecological site was limited. At times, willow was browsed and seeds of graminoids grazed.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference

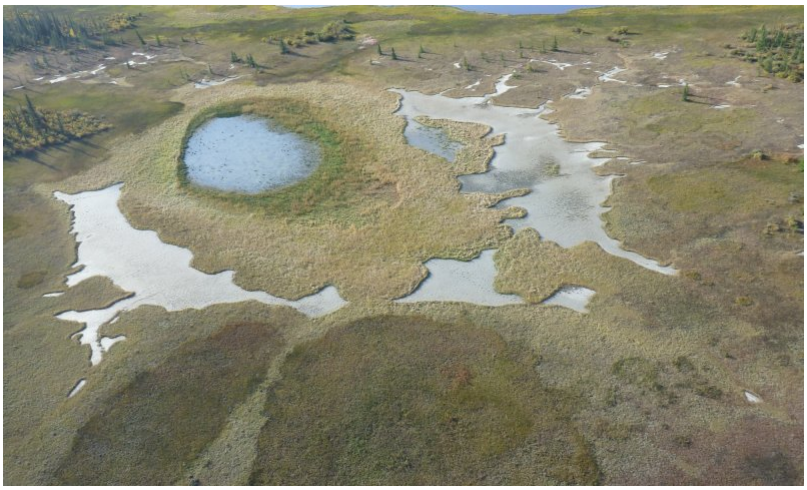


Figure 12. Aerial image of a closed depression on a stream terrace in the Yukon Flats Lowlands MLRA.

The reference state has three associated plant communities, which 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 ponding and a water table. 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 names are from the USDA PLANTS database. All communities in the report are characterized using the Alaska Vegetation Classification (Viereck et al. 1992).

Community 1.1
Slimstem reedgrass-foxtail barley

Community Phase 1.1 Canopy Cover Table

Vegetation data is aggregated across all sample plots for this community phase and 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)
G	foxtail barley	*Hordeum jubatum*	HOJU	83	9 (0-50)
G	slimstem reedgrass	*Calamagrostis stricta*	CAST36	77	40 (0-98)
G	slender wheatgrass	*Elymus trachycaulus*	ELTR7	43	5 (0-75)
G	sedge	*Carex spp.*	CAREX	40	5 (0-30)
G	arctic rush	*Juncus arcticus*	JUAR2	37	15 (0-95)
G	Nuttall's alkaligrass	*Puccinellia nuttalliana*	PUNU2	26	6 (0-70)
G	bluejoint	*Calamagrostis canadensis*	CACA4	26	5 (0-65)
G	red fescue	*Festuca rubra*	FERU2	17	5 (0-65)
F	common yarrow	*Achillea millefolium*	ACMI2	57	1 (0-5)
F	great burnet	*Sanguisorba officinalis*	SAOF3	34	0.1 (0.1-4)
F	largeleaf avens	*Geum macrophyllum*	GEMA4	26	2 (0-25)

This dataset includes data from 35 sample plots. The sample 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

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.

The reference plant community is characterized as mesic graminoid herbaceous (Viereck et al. 1992). Commonly observed species are slimstem reedgrass, foxtail barley, arctic rush, slender wheatgrass, multiple sedge species (dominantly *Carex aquatilis* and *Carex atherodes*), Nuttall's alkaligrass, and bluejoint. The reference plant community typically has a highly diverse assemblage of locally rare species in the Yukon Flats Lowlands. These species include alpine meadow-foxtail (*Alopecurus magellanicus*), marsh felwort (*Lomatogonium rotatum*), redwool plantain (*Plantago eriopoda*), silvery primrose (*Primula incana*), pursh seepweed (*Suaeda calceoliformis*), and northern bog aster (*Symphyotrichum boreale*). The soil surface is primarily covered by herbaceous litter. The vegetative strata that characterize this community are medium graminoids (10 to 60 cm in height), tall graminoids (greater than 60 cm in height), and medium forbs (10 to 60 cm in height).

Dominant plant species

- foxtail barley (*Hordeum jubatum*), grass
- slimstem reedgrass (*Calamagrostis stricta*), grass
- slender wheatgrass (*Elymus trachycaulus*), grass
- sedge (*Carex*), grass
- arctic rush (*Juncus arcticus*), grass

- Nuttall's alkaligrass (*Puccinellia nuttalliana*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- red fescue (*Festuca rubra*), grass
- foxtail (*Alopecurus*), grass
- common yarrow (*Achillea millefolium*), other herbaceous
- great burnet (*Sanguisorba officinalis*), other herbaceous
- largeleaf avens (*Geum macrophyllum*), other herbaceous
- marsh felwort (*Lomatogonium rotatum*), other herbaceous
- redwool plantain (*Plantago eriopoda*), other herbaceous
- primrose (*Primula*), other herbaceous
- aster (*Symphyotrichum*), other herbaceous

Community 1.2
Sedge-reedgrass / largeleaf avens-fleshy starwort

Figure 13. Typical plant community associated with community 1.2.

Community Phase 1.2 Canopy Cover Table

Vegetation data is aggregated across all sample plots for this community phase and 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)
G	reedgrass	*Calamagrostis spp.*	CALAM	80	2 (0-10)
G	water sedge	*Carex aquatilis*	CAAQ	73	40 (0-80)
G	wheat sedge	*Carex atherodes*	CAAT2	47	20 (0-70)
G	foxtail barley	*Hordeum jubatum*	HOJU	47	4 (0-35)
G	Northwest Territory sedge	*Carex utriculata*	CAUT	20	8 (0-60)
F	largeleaf avens	*Geum macrophyllum*	GEMA4	67	2 (0-15)
F	three-petal bedstraw	*Galium trifidum*	GATR2	40	1 (0-10)
F	fleshy starwort	*Stellaria crassifolia*	STCR	33	2 (0-7)
F	arctic raspberry	*Rubus arcticus*	RUAR	20	2 (0-20)

This dataset includes data from 15 sample plots. The sample plots are distributed across the surve area and are independent of one another.

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 14. Canopy cover table for community 1.2.

Community 1.2 is characterized as wet graminoid herbaceous (Viereck et al. 1992). It has a much higher percentage of sedge cover as compared to reference plant community 1.1. Commonly observed species are water sedge (*Carex aquatilis*), wheat sedge (*Carex atherodes*), Northwest Territory sedge (*Carex utriculata*), foxtail barley, multiple species of reedgrass (primarily *Calamagrostis canadensis* and *Calamagrostis stricta*), largeleaf avens (*Geum macrophyllum*), and fleshy starwort (*Stellaria crassifolia*). The soil surface is primarily covered by herbaceous litter. The vegetative strata that characterize this community are medium graminoids (10 to 60 cm in height), tall graminoids (greater than 60 cm in height), and medium forbs (10 to 60 cm in height).

Dominant plant species

- reedgrass (*Calamagrostis*), grass
- water sedge (*Carex aquatilis*), grass
- wheat sedge (*Carex atherodes*), grass
- foxtail barley (*Hordeum jubatum*), grass
- Northwest Territory sedge (*Carex utriculata*), grass
- largeleaf avens (*Geum macrophyllum*), other herbaceous
- threepetal bedstraw (*Galium trifidum*), other herbaceous
- fleshy starwort (*Stellaria crassifolia*), other herbaceous
- arctic raspberry (*Rubus arcticus*), other herbaceous

Community 1.3
Water sedge-bluejoint / water horsetail-fleshy starwort

Figure 15. Typical plant community associated with community 1.3.

Community Phase 1.3 Canopy Cover Table

Vegetation data is aggregated across all sample plots for this community phase and 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)
S	willow	*Salix spp.*	SALIX	60	15 (0-80)
G	bluejoint	*Calamagrostis canadensis*	CACA4	50	3 (0-20)
G	sedge	*Carex spp.*	CAREX	40	20 (0-75)
G	American sloughgrass	*Beckmannia syzigachne*	BESY	40	8 (0-50)
G	foxtail barley	*Hordeum jubatum*	HOJU	40	4 (0-30
G	common rivergrass	*Scolochloa festucacea*	SCFE	30	20 (0-65)
G	American mannagrass	*Glyceria grandis*	GLGR	20	5 (0-40)
G	softstem bulrush	*Schoenoplectus tabernaemontani*	SCTA2	20	4 (0-40)
F	water horsetail	*Equisetum fluviatile*	EQFL	50	15 (0-80)
F	marsh willowherb	*Epilobium palustre*	EPPA	50	1 (0-5)
F	broadleaf cattail	*Typha latifolia*	TYLA	40	4 (0-20)
F	fireweed	*Chamerion angustifolium*	CHAN9	40	2 (0-20)
F	marsh fleabane	*Senecio congestus*	SECO2	40	2 (0-15)
F	common mare's-tail	*Hippuris vulgaris*	HIVU2	40	1 (0-3)
F	fleshy starwort	*Stellaria crassifolia*	STCR	30	6 (0-50)

This dataset includes data from 10 sample plots. The sample 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

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.

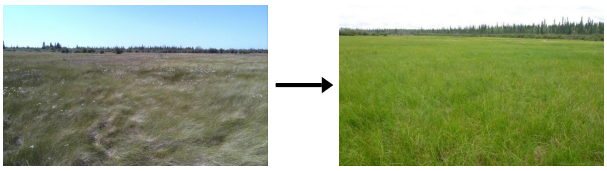
Community 1.3 is characterized as wet graminoid herbaceous (Viereck et al. 1992). It generally is directly adjacent to standing bodies of water in closed terrace depressions. Commonly observed species include a mixture of willow (most commonly S. pseudomonticola), sedges (most commonly water sedge and wheat sedge), common rivergrass (*Scolochloa festucacea*), foxtail barley, bluejoint, water horsetail (*Equisetum fluviatile*), fleshy starwort, and broadleaf cattail (*Typha latifolia*). The soil surface is generally covered by herbaceous litter and ponded water. The vegetative strata that characterize this community are tall graminoids (greater than 60 cm in height), tall forbs (greater than 60 cm in height), and medium graminoids (10 to 60 cm in height).

Dominant plant species

- false mountain willow (*Salix pseudomonticola*), shrub
- willow (*Salix*), shrub
- water sedge (*Carex aquatilis*), grass
- sedge (*Carex*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- American sloughgrass (*Beckmannia syzigachne*), grass
- foxtail barley (*Hordeum jubatum*), grass
- common rivergrass (*Scolochloa festucacea*), grass
- American mannagrass (*Glyceria grandis*), grass
- softstem bulrush (*Schoenoplectus tabernaemontani*), grass
- water horsetail (*Equisetum fluviatile*), other herbaceous
- marsh willowherb (*Epilobium palustre*), other herbaceous
- broadleaf cattail (*Typha latifolia*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous
- marsh fleabane (*Senecio congestus*), other herbaceous
- common mare's-tail (*Hippuris vulgaris*), other herbaceous
- fleshy starwort (*Stellaria crassifolia*), other herbaceous

Pathway 1.1a

Community 1.1 to 1.2

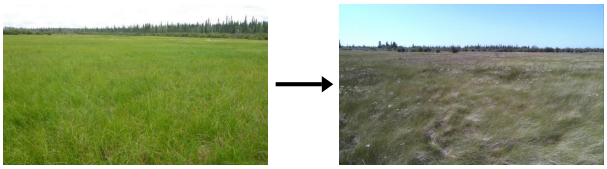


Slimstem reedgrass-foxtail barley

Sedge-reedgrass / largeleaf avens-fleshy starwort

More frequent, longer duration ponding. If site conditions become wetter, the duration of ponding and length of the growing season with a persistent water table increases. These conditions favor community 1.2. It is known that certain depressions can become wetter or drier based on long-term climatic influences; however, for unknown and likely complex reasons, site conditions can become wetter rapidly in depressions across the Yukon Flats Lowlands.

Pathway 1.2a
Community 1.2 to 1.1

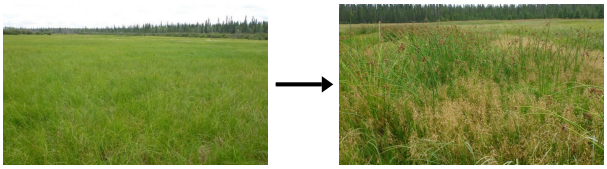


Sedge-reedgrass / largeleaf avens-fleshy starwort

Slimstem reedgrass-foxtail barley

Less frequent, shorter duration ponding. If site conditions become drier, the duration of ponding and length of the growing season with a persistent water table decreases. These conditions favor community 1.1.

Pathway 1.2b
Community 1.2 to 1.3

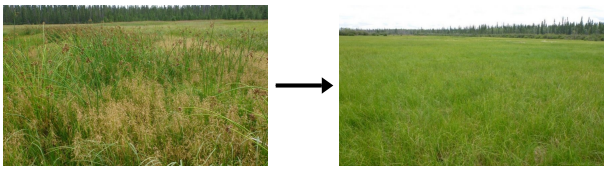


Sedge-reedgrass / largeleaf avens-fleshy starwort

Water sedge-bluejoint / water horsetail-fleshy starwort

More frequent, longer duration ponding. If site conditions become wetter, the duration of ponding and length of the growing season with a persistent water table increases. These conditions favor community 1.3.

Pathway 1.3a
Community 1.3 to 1.2



Water sedge-bluejoint / water horsetail-fleshy starwort

Sedge-reedgrass / largeleaf avens-fleshy starwort

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

Additional community tables

Inventory data references

NASIS User Site ID / Modal Datasets

10BB00801 plant community 1.1
10BB01201 plant community 1.1
10BB01901 plant community 1.1
10BL01004 plant community 1.1
10BL01305 plant community 1.1
10BL01604 plant community 1.1
10BL01606 plant community 1.1
10BL01706 plant community 1.1
10BL01903 plant community 1.1
10BL02103 plant community 1.1
11BB05501 plant community 1.1
11BB06901 plant community 1.1
11SN03001 plant community 1.1
11TD09705 plant community 1.1
12NR01605 plant community 1.1
12NR02001 plant community 1.1
12NR02004 plant community 1.1
12NR02105 plant community 1.1
12NR02402 plant community 1.1
12SN00103 plant community 1.1
12SN00401 plant community 1.1
12SN01401 plant community 1.1
12TR00404 plant community 1.1
13BA01202 plant community 1.1
13NR01803 plant community 1.1
14AK2903012 plant community 1.1
14NR00301 plant community 1.1
2015AK290407 plant community 1.1
2015AK290604 plant community 1.1
2015AK290651 plant community 1.1
2015AK290988 plant community 1.1
2015AK290992 plant community 1.1
S2012AK290003 plant community 1.1
S2014AK290010 plant community 1.1
S2015AK290009 plant community 1.1
10BB00804 plant community 1.2
10BB00904 plant community 1.2
10BB01206 plant community 1.2
10BL00901 plant community 1.2
11BB06506 plant community 1.2
11BB07303 plant community 1.2
11TD08801 plant community 1.2
11TD09601 plant community 1.2
12NR00601 plant community 1.2
12NR01901 plant community 1.2
12NR02704 plant community 1.2
12SN00302 plant community 1.2
12SN01201 plant community 1.2
14NR01003 plant community 1.2
2015AK290710 plant community 1.2
11BB05301 plant community 1.3
11BB06307 plant community 1.3
11TD09204 plant community 1.3
11TD09604 plant community 1.3
12BS00102 plant community 1.3
12NR01101 plant community 1.3
12NR02404 plant community 1.3
12SN01001 plant community 1.3

13BS00104 plant community 1.3
2015AK290625 plant 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:**