

Ecological site XA232X02Y203

Boreal Scrub Loamy Frozen Drainages

Last updated: 5/18/2020
Accessed: 05/13/2025

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 uplands LRU.

Classification relationships

Yukon Flats Lowlands MLRA.

Ecological site concept

This ecological site occurs in drainageway of the marginal uplands region of the Yukon Flats Lowlands MLRA. The marginal uplands are characterized by broad and extensive plains. Associated soils flood occasionally (5 to 50 times in 100 years) for long durations of time (between 7 and 30 days). Soils range from poorly to very poorly drained. The reference state supports one documented plant community.

The reference plant community is characterized as closed tall scrub (Viereck et al. 1992). Black spruce (*Picea mariana*) commonly occurs but cover is generally low. Commonly observed species include Siberian alder (*Alnus viridis* ssp. *fruticosa*), thinleaf alder (*Alnus incana* ssp. *tenuifolia*), tealeaf willow (*Salix pulchra*), Bebb willow (*Salix bebbiana*), bog blueberry (*Vaccinium uliginosum*), leatherleaf (*Chamaedaphne calyculata*), marsh Labrador tea (*Ledum palustre* ssp. *decumbens*), bluejoint (*Calamagrostis canadensis*), and marsh cinquefoil (*Comarum palustre*).

Associated sites

XA232X02Y210	Boreal Forest Loamy Frozen Plains Warm This ecological site occurs on warmer slope positions (i.e. South facing slopes) in the marginal uplands region of the Yukon Flats Lowlands MLRA. Associated soils have very deep loess deposition and are well drained. The reference plant community phase is characterized as an open needleleaf forest (25 to 60 percent cover; Viereck et al. 1992) primarily composed of mature white spruce (<i>Picea glauca</i>).
XA232X01Y201	Boreal Woodland Peat Frozen Terraces This ecological site occurs in organic rich bogs in the lowlands and marginal uplands regions of the Yukon Flats Lowlands MLRA. The cumulative thickness of organic material often exceeds 50 inches in the soil profile. Reference state soils are poorly drained and organic material is considered ultra to extremely acidic. The soils associated with the reference plant community generally has permafrost at moderate depth (20 to 40 inches). This ecological site has an alternative state related to thermokarst.
XA232X02Y217	Boreal Woodland Loamy Frozen Plain Wet This ecological site occurs where water accumulates on the slopes (i.e. lower third of slopes and swales) of the marginal uplands region of the Yukon Flats Lowlands MLRA. The marginal uplands are characterized by broad and extensive plains. Associated soils have very deep loess deposition, are prone to ponding, and are poorly drained. The reference plant community is characterized as needleleaf woodland (10 to 25 percent cover; Viereck et al. 1992) primarily composed of black spruce (<i>Picea mariana</i>).
XA232X02Y211	Boreal Loamy Escarpments This ecological site is associated with steep and erosive slopes in the marginal uplands region of the Yukon Flats Lowlands MLRA. During field work, these escarpments were not sampled and this ecological site is currently a provisional concept.
XA232X02Y227	Boreal Forest Loamy Frozen Plains Cold This ecological site occurs on colder slope positions (i.e. North facing slopes) in the marginal uplands region of the Yukon Flats Lowlands MLRA. Associated soils have very deep loess deposition and range from poorly to somewhat poorly drained. The reference plant community is characterized as an open needleleaf forest (25 to 60 percent cover; Viereck et al. 1992) primarily composed of black spruce.

Similar sites

XA232X01Y280	Boreal Scrub Loamy Flood Plain Wet While XA232X01Y280 has a closed tall scrub reference state community, this ecological sites occurs on minor, low-gradient stream in the lowlands region of this MLRA. When compared to XA232X02Y203, this flood plain ecological site has different plant community composition and associated reference state plant communities.
XA232X01Y200	Boreal Scrub Loamy Flood Plain Low While XA232X01Y200 has a closed tall scrub reference state community, this ecological sites occurs on major flood plains in the lowlands region of this MLRA. When compared to XA232X02Y203, this flood plain ecological site has different plant community composition and associated reference state plant communities.

Table 1. Dominant plant species

Tree	Not specified
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Shrub	(1) <i>Alnus</i> (2) <i>Salix</i>
Herbaceous	(1) <i>Calamagrostis canadensis</i> (2) <i>Comarum palustre</i>

Legacy ID

R232XY203AK

Physiographic features

This ecological site and its associated plant community occurs in drainageways in the marginal uplands region of the Yukon Flats Lowlands MLRA. The marginal uplands are characterized by broad and extensive plains. Due to weathering, these plains are often highly dissected and often resemble hill complexes. In areas where plains are highly dissected, slopes can be steep. This ecological site is associated with areas within the marginal uplands that have very deep accumulations of loess (greater than 60 inches).

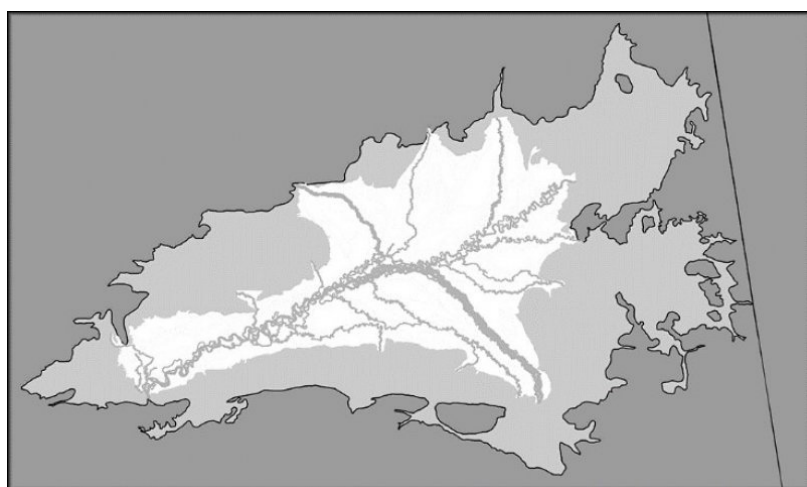


Figure 1. Lowlands region (white) and marginal uplands region (light gray) of the Yukon Flats Lowlands MLRA.



Figure 2. Aerial image of the marginal uplands. Drainageways are common in the marginal uplands and are the linear features in this image.

Table 2. Representative physiographic features

Landforms	(1) Plains > Drainageway
Flooding duration	Long (7 to 30 days)
Flooding frequency	Occasional
Ponding frequency	None

Elevation	91–503 m
Slope	1–5%
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).

The tabular data in this report is specific to the marginal uplands LRU in the Yukon Flats Lowlands MLRA. All tabular data was calculated from the PRISM dataset (1971-2000).

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)	229-559 mm
Frost-free period (average)	75 days
Freeze-free period (average)	
Precipitation total (average)	279 mm

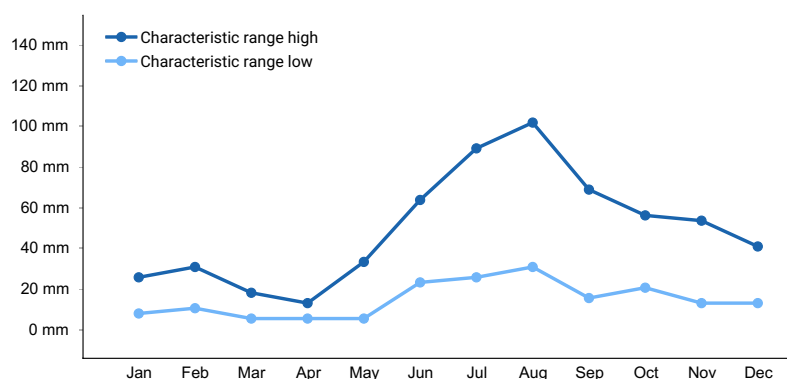


Figure 3. Monthly precipitation range

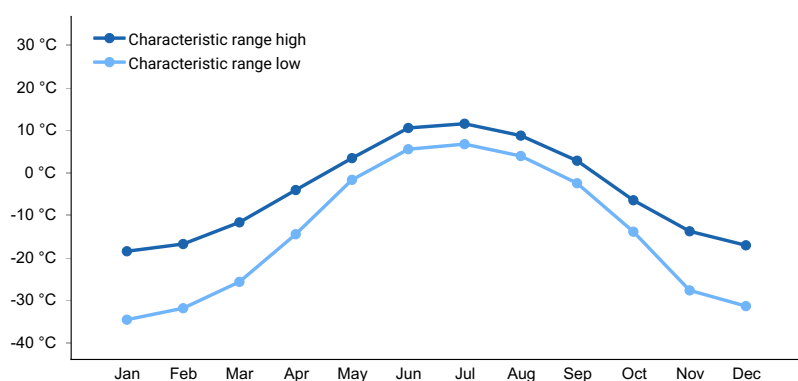


Figure 4. Monthly minimum temperature range

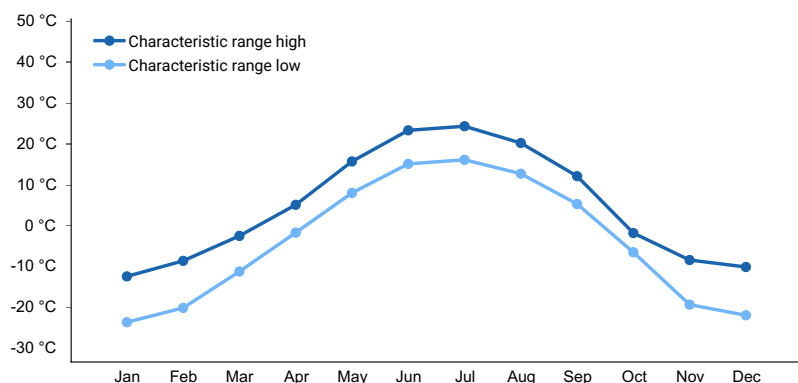


Figure 5. Monthly maximum temperature range

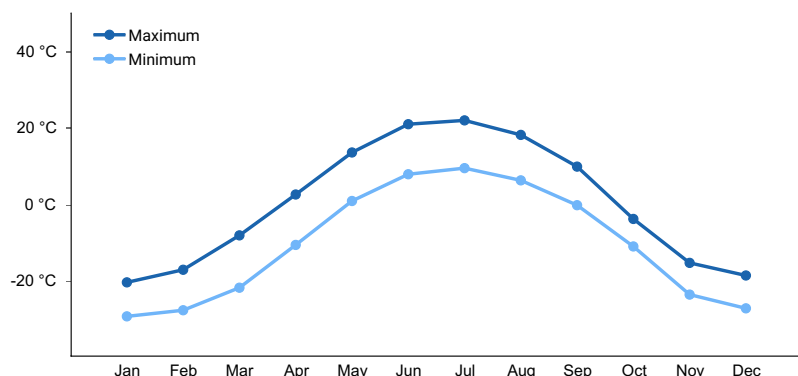


Figure 6. Monthly average minimum and maximum temperature

Influencing water features

During the spring and early growing season (May and June), a perched water table is over the seasonal frost in the soil profile resulting in wet soils at very shallow depth (less than 10 inches). As the seasonal frost melts, the water drains from these soils. During long portions of the growing season, a water table is commonly at shallow depths (10 to 20 inches) in the soil profile. Ponding duration and the typical depth to the water table was determined through field observations.

Due to the depth and persistence of this water table, wetland indicator plants are commonly observed in the reference state.

Soil features

Correlated soil components for the Soil Survey of Yukon-Charley Rivers National Preserve Area Alaska (AK684): D32-Boreal woodland loamy drainages, frozen.

Correlated soil components for the Yukon Flats Areas, Alaska soil survey (AK685): Fluvaquentic Aquorthels.



Figure 7. Typical soil profile associated with Fluvaquentic Aquorthels soil component.

Table 4. Representative soil features

Parent material	(1) Organic material (2) Alluvium
Family particle size	(1) Coarse-loamy
Drainage class	Very poorly drained to poorly drained
Soil depth	203 cm

Ecological dynamics

Flooding

This drainageway ecological site is thought to flood occasionally (5 to 50 times in 100 years) for long durations of time (between 7 and 30 days). Flooding is a disturbance regime that may prevent tree colonization and establishment and help maintain dominance of tall shrubs.

Other Observations

Due to limited sampling in these drainageways, no flood- or fire-related communities were documented for this ecological site. Future data collection efforts will likely result in additional disturbance related plant communities.

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

No alternative states for this ecological site were documented.

State and transition model

Ecosystem states

1. Reference

State 1 submodel, plant communities

1.1. Alder-willow /
bluejoint / marsh
cinquefoil

State 1 Reference



Figure 8. The marginal uplands region of the Yukon Flats Lowlands MLRA. This ecological site is associated with drainageways in the marginal uplands.

The reference state has one associated plant community, which is largely controlled through water table influences and flooding. Fire is thought to occur in these shrubby drainageways as charcoal was found in soil pits. However, plant communities related to post-fire succession were not documented. This report provides baseline vegetation inventory data for the ecological site. More data collection is needed to provide further information about existing plant communities and the disturbance regimes that would result in transitions from one community to another. The common and scientific plant names are from the USDA PLANTS database. All communities in this report are characterized using the Alaska Vegetation Classification (Viereck et al. 1992).

Community 1.1

Alder-willow / bluejoint / marsh cinquefoil



Figure 9. Typical plant community associated with community 1.1.

Community Phase 1.1 Canopy Cover Table

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

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
T	black spruce	<i>Picea mariana</i>	PIMA	67	10 (0-15)
S	alder	<i>Alnus spp.</i>	ALNUS	100	45 (35-50)
S	willow	<i>Salix spp.</i>	SALIX	100	40 (15-70)
S	bog blueberry	<i>Vaccinium uliginosum</i>	VAUL	67	15 (0-40)
S	leatherleaf	<i>Chamaedaphne calyculata</i>	CHCA2	67	8 (0-15)
S	shrub birch	<i>Betula glandulosa</i>	B EGL	67	5 (0-10)
S	Labrador tea	<i>Ledum spp.</i>	LEDUM	67	15 (0-35)
G	bluejoint	<i>Calamagrostis canadensis</i>	CALAM	100	30 (3-70)
F	marsh cinquefoil	<i>Comarum palustre</i>	COPA28	67	3 (0-10)
F	horsetail	<i>Equisetum spp.</i>	EQUIS	67	5 (0-8)
B	Sphagnum moss	<i>Sphagnum spp.</i>	SPHAG2	33	20 (0-60)

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

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

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

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

Figure 10. Canopy cover table associated with community 1.1.

The reference plant community is characterized as closed tall scrub. Black spruce commonly occurs but cover is generally low. Commonly observed species include Siberian alder, thinleaf alder, tealeaf willow, Bebb willow, bog blueberry, leatherleaf, marsh Labrador tea, bluejoint, and marsh cinquefoil. The soil surface is primarily covered with herbaceous litter and woody debris. In certain sample locations, moss is abundant. The vegetative strata that characterize this community are tall shrubs (greater than 10 feet in height), low shrubs (between 8 and 36 inches), and tall graminoids (greater than 24 inches).

Forest overstory. Values for tall, medium, regenerative, and stunted tree strata are used to calculate canopy cover range values in the forest overstory composition table. Regenerative trees are not considered part of the overstory canopy cover percentage.

Dominant plant species

- black spruce (*Picea mariana*), tree
- thinleaf alder (*Alnus incana ssp. tenuifolia*), shrub
- Siberian alder (*Alnus viridis ssp. fruticosa*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- Bebb willow (*Salix bebbiana*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- leatherleaf (*Chamaedaphne calyculata*), shrub
- resin birch (*Betula glandulosa*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous
- horsetail (*Equisetum*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
black spruce	PIMA	<i>Picea mariana</i>	Native	–	0–15	–	–

Inventory data references

NASIS User Site ID / Modal Datasets

08CS02701 plant community 1.1

08TC02104 plant community 1.1

2015AK290804 plant community 1.1

Other references

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Schoeneberger, P.J., and D.A. Wysocki. 2012. Geomorphic description system. Version 4.2. U.S. Department of Agriculture, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.

Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and W.D. Broderson, editors. 2012. Field book for describing and sampling soils. Version 3.0. U.S. Department of Agriculture, Natural Resources Conservation Service.

Soil Survey Division Staff. 2017. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Viereck, L.A., C.T. Dyrness, A.R. Batten, and K.J. Wezlick. 1992. The Alaska vegetation classification. U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station General Technical Report PNW-GTR-286.

Williams, J.R. 1962. Geologic reconnaissance of the Yukon Flats District, Alaska. U.S. Department of the Interior, Geologic Survey Bulletin 1111-H.

Contributors

Blaine T. Spellman

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:**
-