# Ecological site XA232X01Y200
# Boreal Scrub Loamy Flood Plain Low

Last updated: 5/11/2020
Accessed: 09/23/2026

## 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 low 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 the middle and high flood plain, the low flood plain has more frequent and longer duration flood events. Flooding occurs frequently (greater then 50 times in 100 years) for long durations of time (between 7 and 30 days). Associated soils are considered poorly drained. The reference state supports four plant communities related to flooding. Reference plant community 1.1 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.). Commonly observed species include feltleaf willow (Salix alaxensis), littletree willow (Salix arbusculoides), Bebb willow (Salix bebbiana), thinleaf alder (Alnus incana ssp. tenuifolia), Siberian alder (Alnus viridis ssp. fruticosa), prickly rose (Rosa acicularis), redosier dogwood (Cornus sericea), and field horsetail (Equisetum arvense). The soil surface is primarily covered with herbaceous litter and woody debris, but large patches of exposed bare soil were observed (as much as 80 percent of plot).

## Associated sites

| | |
|---|---|
| **XA232X01Y209** | **Boreal Tussock Loamy Frozen Terraces**<br><br>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). |
| **XA232X01Y202** | **Boreal Forest Loamy Flood Plain Middle**<br><br>This ecological site occurs on 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). |
| **XA232X01Y221** | **Boreal Forest Loamy Terraces**<br><br>This ecological site is associated with 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). |
| **XA232X01Y205** | **Boreal Grass Loamy Flood Plain Depressions**<br><br>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.). |
| **XA232X01Y204** | **Boreal Forest Loamy Flood Plain High**<br><br>This ecological site occurs on the high flood plain of major tributaries in the Yukon Flats Lowlands MLRA. 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 an open needleleaf forest (25 to 60 percent cover) primarily composed of mature white spruce (Picea glauca). |
| **XA232X01Y218** | **Boreal Woodland Loamy Frozen Terraces**<br><br>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). |
| **XA232X01Y250** | **Boreal Woodland Gravelly Terraces Dry**<br><br>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). |

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|---|---|
| **XA232X01Y206** | **Boreal Scrub Loamy Frozen Flood Plain Depressions**<br><br>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). |

## Similar sites

| | |
|---|---|
| **XA232X01Y206** | **Boreal Scrub Loamy Frozen Flood Plain Depressions**<br><br>XA232X01Y206 occurs on the edges of flood plain depressions and is commonly associated with permafrost. This shrubby ecological site has similar similar reference state plant communities. |
| **XA232X01Y223** | **Boreal Scrub Loamy Frozen Terrace Depressions**<br><br>XA232X01Y223 occurs on the edges of terrace depressions and is commonly associated with permafrost. This shrubby ecological site has similar similar reference state plant communities. |
| **XA232X01Y280** | **Boreal Scrub Loamy Flood Plain Wet**<br><br>XA232X01Y280 is associated with the flood plain of minor tributaries and is associated with wetter soils. These differences in landform position, disturbance regime, and soil type result in similar, but unique, plant community phases for each ecological site. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Salix alaxensis*<br>(2) *Alnus incana ssp. tenuifolia* |
| Herbaceous | (1) *Equisetum arvense* |

## Legacy ID

R232XY200AK

## Physiographic features

This ecological site and its associated plant 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 created large gravelly stream terraces north of the Yukon River (e.g. Sheenjek River). The soils on these stream terraces and adjacent flood plains tend to have a sandy and gravelly substrata. 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 substrata (Typic Cryaquents, frequently flooded soils).

Each soil type originally had a correspondingly unique ecological site. After more fieldwork and data analysis, it was determined that

these two soil types appear to support plant communities that have similar kinds and amounts of vegetation in the reference state. As a result, the soil components were all correlated into one ecological site.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Alluvial plain > Flood plain |
| Flooding duration | Long (7 to 30 days) |
| Flooding frequency | Frequent |
| Ponding frequency | None |
| Elevation | 90 – 310 m |
| Slope | 0 % |
| 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) | 50-100 days |
| Freeze-free period (characteristic range) | 70-120 days |
| Precipitation total (characteristic range) | 200-330 mm |
| Frost-free period (average) | 80 days |
| Freeze-free period (average) | |
| Precipitation total (average) | 250 mm |

## Influencing water features

During the early growing season (May and June), a water table commonly occurs at very shallow depths in the soil profile (between 0 and 10 inches). This time period is when rivers typically have peak volume in the Yukon Flats Lowlands , which directly impacts the water table in the soil profile. During the early growing season, overland flooding occurs frequently (greater then 50 times in 100 years) for long durations of time (between 7 and 30 days). After the early growing season, the water drains from these soils. During the rest of the growing season, a water table is typically no longer observed in the soil profile (60+ inches). The typical depth to the water table was determined through field observation and by the presence of redoximorphic features in the soil profile.

## Soil features

Correlated soil components for Yukon Flats Area, Alaska (AK685): Typic Cryaquents, frequently flooded.

**Figure 5. Typical soil profile of Typic cryaquents (frequently flooded) soil component.**

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium |
| Family particle size | (1) Coarse-loamy over sandy or sandy-skeletal<br>(2) Coarse-loamy |
| Drainage class | Poorly drained |
| Soil depth | 200 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 dominant reference plant community (community 1.1). The middle flood plain ecological site is thought to flood occasionally (5 to 50 times in 100 years) for long durations of time and supports a balsam poplar dominant reference plant community. The high flood plain ecological site is thought to flood occasionally for brief durations of time (2 to 7 days) and supports a white spruce (Picea glauca) 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. On other Interior Alaska flood plains, this successional process is thought to take between 200 and 300 years (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 and/or severely then other communities. As flooding frequency and duration decreases, willow and alder cover increases. Given this observation, more frequently flooded plant communities were incorporated into the reference state (community 1.2, 1.3, and 1.4). These plant communities likely represent the successional transition from river wash to the reference plant community 1.1.

Other Observations

Community 1.3 and 1.4 are both considered pioneering phases of flood plain succession. Community 1.3 is associated with wetter soil conditions and community 1.4 with drier soil conditions. Regardless of these differences, both plant communities are believed to transition to community 1.2.

Animal use (browsing and grazing) of this ecological site primarily consists of slight moose browse on willow, which was common in each community phase. A browse severity rating of slight on willow is defined as a majority of individual plants having no signs of browsing.

## State and transition model

## Additional community tables

**Table 5. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 6. Community 1.2 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 7. Community 1.3 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 8. Community 1.4 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

## Inventory data references

NASIS User Site ID / Modal Datasets 10BB03704 plant community 1.1 10BB04402 plant community 1.1 10BB02302 plant community 1.1 10BB00503 plant community 1.1 10BL03104 plant community 1.1 10BL03602 plant community 1.1 10BL03801 plant community 1.1 10BL03804 plant community 1.1 10BL04002 plant community 1.1 11TD09103 plant community 1.1 11TD09405 plant community 1.1 12NR00502 plant community 1.1 12BB00402 plant community 1.1 13BA01401 plant community 1.1 2015AK290406 plant community 1.1 2015AK290712 plant community 1.1 10BB02702 plant community 1.2 10BL03901 plant community 1.2 10BL04304 plant community 1.2 10BL04401 plant community 1.2 10BL04602 plant community 1.2 10BL04604 plant community 1.2 11BB05701 plant community 1.2 11SN02904 plant community 1.2 10BB00304 plant community 1.3 10BL00503 plant community 1.3 10BL03105 plant community 1.3 10DM01803 plant community 1.3 11BB06701 plant community 1.3 11SN02905 plant community 1.3 11TD09102 plant community 1.3 10BB03403 plant community 1.4 10BB03405 plant community 1.4 11BB06602 plant community 1.4

## Other references

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Walker, L.R., J.C. Zasada, and F.S. Chapin, III. 1986. The role of life history processes in primary succession on an Alaskan flood plain. Ecology, 67: 1243-1253.

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## Contributors

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## Approval

Michael Margo, 5/11/2020

## 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 | 05/07/2020 |
| Approved by | |
| 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):**

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

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

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

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

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

    **Dominant:**

    **Sub-dominant:**

    **Other:**

    **Additional:**

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

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

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

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

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17. **Perennial plant reproductive capability:**

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