

Ecological site XA232X01Y205

Boreal Grass Loamy Flood Plain Depressions

Last updated: 5/18/2020
Accessed: 07/17/2024

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 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). Associated soils are considered poorly drained. The reference state supports two plant communities, where drier soils are associated with community 1.1 and wetter soils are associated with community 1.2.

Reference plant community 1.1 is characterized as mesic graminoid herbaceous (Viereck et al. 1992) and is primarily composed of bluejoint (*Calamagrostis canadensis*). A mixture of sedge (*Carex* spp.), largeleaf avens (*Geum macrophyllum*), a mixture of starwort (*Stellaria* spp.), fireweed (*Chamerion angustifolium*), a mixture of horsetail (*Equisetum* spp.), threepetal bedstraw (*Galium trifidum*), and wild mint (*Mentha arvensis*) are commonly observed.

Associated sites

XA232X01Y218	Boreal Woodland Loamy Frozen Terraces This ecological site is associated with wet soils on the tread of terraces directly adjacent to the flood plain of major tributaries 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 (<i>Picea mariana</i>) and white spruce (<i>Picea glauca</i>).
XA232X01Y219	Boreal Forest Loamy Terraces Moist This ecological site is associated with moderately well drained soils on the treads of stream terraces and alluvial fan remnants 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 (<i>Picea glauca</i>).
XA232X01Y280	Boreal Scrub Loamy Flood Plain Wet This ecological site occurs on the flood plain and adjacent terraces of minor, low-gradient tributaries in the lowlands region of the Yukon Flats Lowlands MLRA. The reference plant community 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 (<i>Salix</i> spp.).
XA232X01Y202	Boreal Forest Loamy Flood Plain Middle 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 (<i>Populus balsamifera</i>).
XA232X01Y204	Boreal Forest Loamy Flood Plain High 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 (<i>Picea glauca</i>).
XA232X01Y250	Boreal Woodland Gravelly Terraces Dry This ecological site is associated with somewhat excessively drained soils on the tread of gravelly stream terraces directly adjacent to the flood plain of major tributaries 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 (<i>Picea glauca</i>).
XA232X01Y200	Boreal Scrub Loamy Flood Plain Low This ecological site 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 (<i>Salix</i> spp.) and alder (<i>Alder</i> 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 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 (<i>Salix</i> spp.).
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 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 (<i>Calamagrostis canadensis</i>).
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).
XA232X01Y222	Boreal Graminoid Loamy Terrace Depressions This ecological site is associated with closed depressions of stream terraces that support a reference state with multiple graminoid-dominant community phases. These depressions are considered closed because they are not associated with a flood regime and have limited, if any, groundwater flow or recharge. The presumed hydrological inputs for this ecological site are primarily thaw of the annual active soil layer and/or permafrost, snowmelt runoff, and precipitation. This hydrologic regime results in the development of sodic soil properties.
XA232X01Y221	Boreal Forest Loamy Terraces This ecological site is associated with well drained soils on the treads of stream terraces and alluvial fan remnants 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 (<i>Picea glauca</i>).
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 (<i>Salix</i> spp.).

Similar sites

XA232X01Y222	Boreal Graminoid Loamy Terrace Depressions While possessing similar plant communities as XA232X01Y222, flooding and parent material is believed to be a major factor that differentiates these two ecological sites. Soils associated with XA232X01Y222 are sodic and occur on closed terrace depressions, while soils associated with this ecological site are not sodic and occur on flood plain depressions.
XA232X01Y280	Boreal Scrub Loamy Flood Plain Wet XA232X01Y280 supports a bluejoint dominant plant community phase that is similar to the reference community phase for this ecological site. XA232X01Y280, and its associated plant communities, represent riparian primary succession on minor, low-gradient tributaries of the Yukon Flats Lowlands MLRA. While having similar communities, differences in landform, soils, disturbance regime, and reference state plant community composition led to two separate ecological site concepts.



Figure 1. A willow dominant plant community associated with ecological site XA232X01Y206. Willow dominant communities commonly occur on the edge of flood plain depressions.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Calamagrostis canadensis</i> (2) <i>Geum macrophyllum</i>

Legacy ID

R232XY205AK

Physiographic features

This ecological site and its associated plant communities commonly occur on flood plain depressions of major tributaries throughout the Yukon Flats Lowlands MLRA. Associated stream landforms include meander scrolls, abandoned channels, and oxbow lakes.

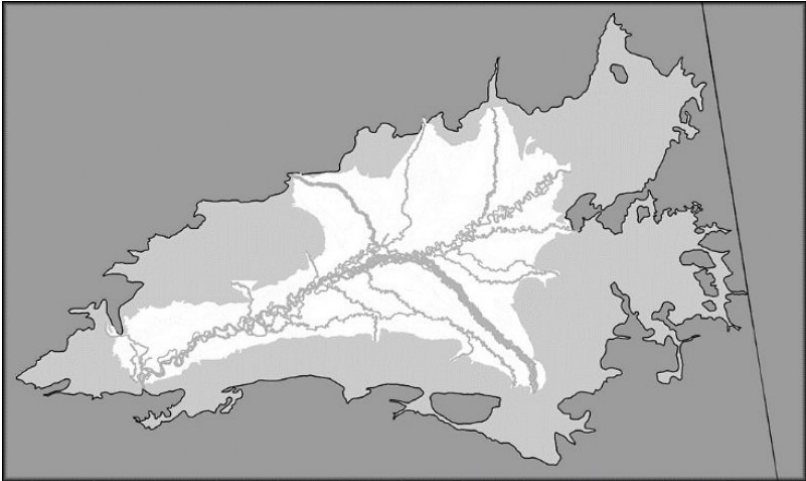


Figure 2. Lowlands region (white) and marginal uplands region (light gray) of the Yukon Flats Lowlands MLRA.

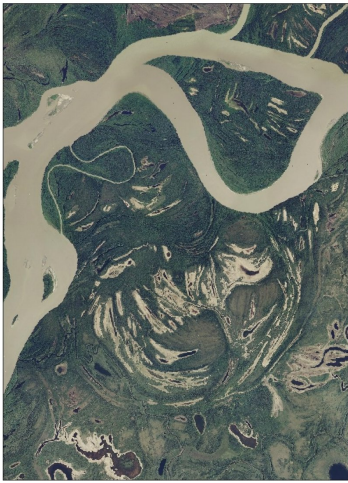


Figure 3. Aerial image of a meander scroll and abandoned channels adjacent to the Yukon River in the Yukon Flats Lowlands MLRA. Depressions with light brown photo tones are most commonly associated with ecological site XA232X01Y205.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain > Closed depression
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Occasional
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Frequent
Elevation	300–650 ft
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)	8-13 in
Frost-free period (average)	75 days
Freeze-free period (average)	
Precipitation total (average)	10 in

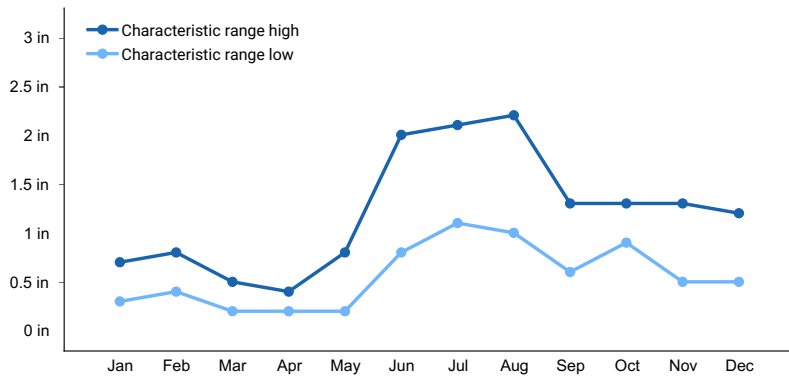


Figure 4. Monthly precipitation range

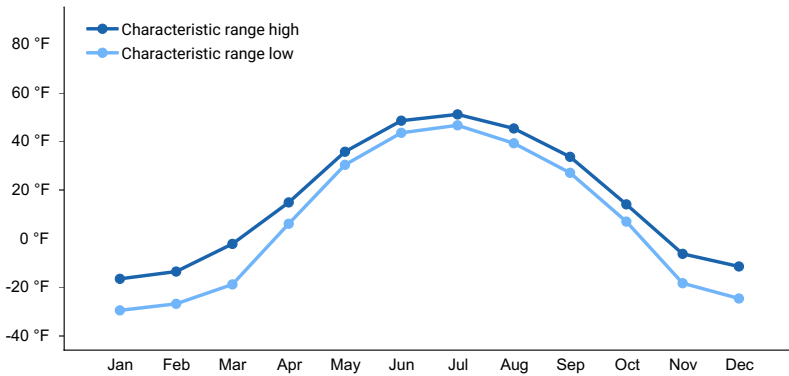


Figure 5. Monthly minimum temperature range

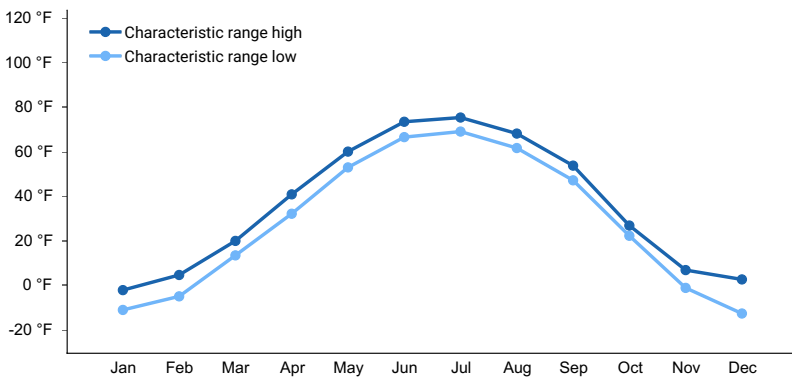


Figure 6. Monthly maximum temperature range

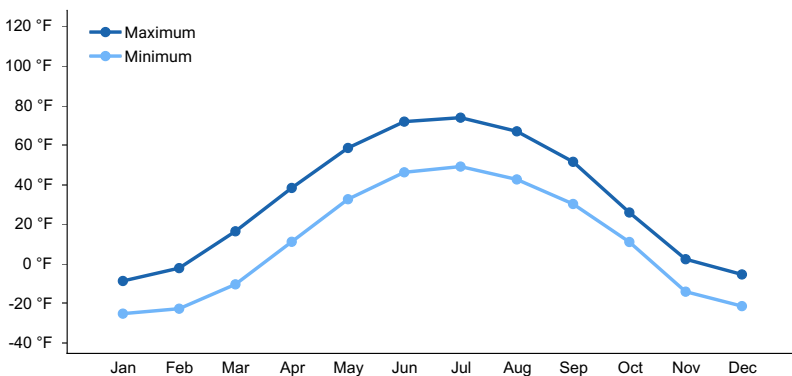


Figure 7. Monthly average minimum and maximum temperature

Influencing water features

During the spring and 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, associated soils are thought to pond frequently for long durations of time. As the seasonal frost melts, the

water drains from these soils. During long portions of the growing season (July through September), a water table commonly occurs at moderate depth (20 to 40 inches) in the soil profile.

Due to the depth and persistence of this water table, wetland indicator plants are commonly observed in the reference state. Ponding duration and the typical depth to the water table was determined through field observations.

Soil features

Correlated soil components: Jokinaugh.

Jokinaugh soil component is considered poorly drained and likely corresponds to community 1.1. Community 1.2 is associated with wetter soils with comparatively longer ponding durations, which may correspond to very poorly drained soils. A specific soil component has not currently been developed for plant community 1.2.



Figure 8. Typical soil profile associated with Jokinaugh soil component.



Figure 9. Typical soil profile associated with Jokinaugh soil component.



Figure 10. Typical soil profile associated with Jokinaugh soil component.

Table 4. Representative soil features

Parent material	(1) Organic material (2) Alluvium
Family particle size	(1) Coarse-silty
Drainage class	Poorly drained
Soil depth	80 in
Sodium adsorption ratio (4-12in)	0-2

Ecological dynamics

Flooding

Associated soils are thought to flood occasionally for brief periods of time. Flooding is thought to occur during the months of May and June. Flooding is believed to be a major factor that differentiates this ecological site from R232XY222AK.

Ponding

Field work indicates that certain sampled communities within the reference state pond more frequently or pond for longer durations of time then other communities. As ponding frequency or duration increases, sedge cover increases and grass cover decreases. Given this observation, a more frequently ponded community was incorporated into the reference state (community 1.2). Community 1.2 most commonly occurs in lower areas of depressions and is often directly adjacent to standing bodies of water.

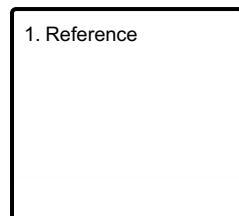
Other Observations

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

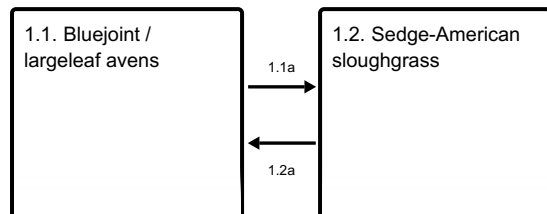
No alternative states for this ecological site were documented.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - More frequent, longer duration ponding.

1.2a - Less frequent, shorter duration ponding.

State 1 Reference



Figure 11. Aerial image of the flood plain and terrace adjacent to the Porcupine River. This ecological site occurs in flood plain depressions.

The reference state has two associated plant communities. Plant communities in the reference state appear to be largely controlled by the influences of ponding and flooding. 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 Bluejoint / largeleaf avens



Figure 12. 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)
S	willow	<i>Salix spp.</i>	SALIX	37	1 (0-4)
G	bluejoint	<i>Calamagrostis canadensis</i>	CACA4	100	80 (55-100)
G	sedge	<i>Carex spp.</i>	CAREX	47	5 (0-40)
F	largeleaf avens	<i>Geum macrophyllum</i>	GEMA4	68	2 (0-10)
F	starwort	<i>Stellaria spp.</i>	STELL	68	1 (0-10)
F	fireweed	<i>Chamerion angustifolium</i>	CHAN9	58	2 (0-10)
F	horsetail	<i>Equisetum spp.</i>	EQUIS	53	6 (0-35)
F	threepetal bedstraw	<i>Galium trifidum</i>	GATR2	32	0.1 (0-4)
F	wild mint	<i>Mentha arvensis</i>	MEAR4	32	1 (0-10)

This dataset includes data from 19 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 13. Canopy cover table for community 1.1.

Reference plant community 1.1 is characterized as mesic graminoid herbaceous and is primarily composed of bluejoint. A mixture of sedge (most commonly *C. utriculata* and *C. atherodes*), largeleaf avens, a mixture of starwort, fireweed, a mixture of horsetail (most commonly *E. arvense*), threepetal bedstraw, and wild mint are commonly observed. The vegetative stratum that characterizes this community are tall graminoids (greater than 2 feet in height). The soil surface is primarily covered with herbaceous litter, but small areas of exposed soil are commonly observed (as much as 20 percent of plot).

Dominant plant species

- willow (*Salix*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- Northwest Territory sedge (*Carex utriculata*), grass
- wheat sedge (*Carex atherodes*), grass
- sedge (*Carex*), grass

- largeleaf avens (*Geum macrophyllum*), other herbaceous
- starwort (*Stellaria*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous
- field horsetail (*Equisetum arvense*), other herbaceous
- threepetal bedstraw (*Galium trifidum*), other herbaceous
- wild mint (*Mentha arvensis*), other herbaceous

Community 1.2

Sedge-American sloughgrass



Figure 14. Typical plant community associated with community 1.2.

Community Phase 1.2 Canopy Cover Table

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

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
G	sedge	<i>Carex</i> spp.	CAREX	100	65 (25-90)
G	bluejoint	<i>Calamagrostis canadensis</i>	CACA4	85	7 (0-35)
G	American sloughgrass	<i>Beckmannia syzigachne</i>	BESY	54	10 (0-80)
F	marsh willowherb	<i>Epilobium palustre</i>	EPPA	54	1 (0-10)
F	largeleaf avens	<i>Geum macrophyllum</i>	GEMA4	46	2 (0-10)
F	common spikerush	<i>Eleocharis palustris</i>	ELPA3	31	4 (0-30)
F	fleshy starwort	<i>Stellaria crassifolia</i>	STCR	31	4 (0-40)
F	fireweed	<i>Chamerion angustifolium</i>	CHAN9	31	0.1 (0-2)
F	marsh cinquefoil	<i>Comarum palustre</i>	COPA28	31	1 (0-3)
F	horsetail	<i>Equisetum</i> spp.	EQUIS	31	1 (0-10)

This dataset includes data from 13 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 15. Canopy cover table for community 1.2.

This ponded community is characterized as wet graminoid herbaceous and is primarily composed of a mixture of sedges. Commonly observed species include wheat sedge (*Carex atherodes*), Northwest Territory sedge (*Carex utriculata*), water sedge (*Carex aquatilis*), bluejoint, American sloughgrass (*Beckmannia syzigachne*), and marsh willowherb (*Epilobium palustre*). The vegetative stratum that characterizes this community are tall graminoids

(greater than 2 feet in height). The soil surface is primarily covered with herbaceous litter, but small areas of exposed soil are observed (as much as 10 percent of plot). At times, the entire soil surface is covered by water.

Dominant plant species

- Northwest Territory sedge (*Carex utriculata*), grass
- water sedge (*Carex aquatilis*), grass
- wheat sedge (*Carex atherodes*), grass
- sedge (*Carex*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- American sloughgrass (*Beckmannia syzigachne*), grass
- common spikerush (*Eleocharis palustris*), grass
- marsh willowherb (*Epilobium palustre*), other herbaceous
- largeleaf avens (*Geum macrophyllum*), other herbaceous
- fleshy starwort (*Stellaria crassifolia*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous
- purple marshlocks (*Comarum palustre*), other herbaceous
- field horsetail (*Equisetum arvense*), other herbaceous

Pathway 1.1a

Community 1.1 to 1.2



Bluejoint / largeleaf avens



Sedge-American sloughgrass

More frequent, longer duration ponding. Areas that are thought to pond less frequently are represented by community 1.1 and areas that are thought to pond more frequently are represented by community 1.2. When compared to community 1.1, the ponded plant community phase has greater sedge cover and less grass cover.

Pathway 1.2a

Community 1.2 to 1.1



Sedge-American sloughgrass



Bluejoint / largeleaf avens

Less frequent, shorter duration ponding. Areas that are thought to pond less frequently are represented by community 1.1 and areas that are thought to pond more frequently are represented by community 1.2. When compared to community 1.1, the ponded plant community has greater sedge cover and less grass cover.

Additional community tables

Inventory data references

NASIS User Site ID / Modal Datasets

08DM05301 plant community 1.1

08DM06103 plant community 1.1

08DM07903 plant community 1.1

10BL01803 plant community 1.1

11BB06704 plant community 1.1

12BB00802 plant community 1.1

12BB00803 plant community 1.1

12BB00903 plant community 1.1

12NR00203 plant community 1.1
12NR00703 plant community 1.1
12NR03101 plant community 1.1
12SN01504 plant community 1.1
12SN01601 plant community 1.1
13NR01903 plant community 1.1
14DM00103 plant community 1.1
14DM00201 plant community 1.1
2015AK290403 plant community 1.1
2015AK290718 plant community 1.1
S2012AK290005 plant community 1.1
10BB02901 plant community 1.2
10BB03301 plant community 1.2
10BB03606 plant community 1.2
10BL03202 plant community 1.2
10BL04703 plant community 1.2
12BB00601 plant community 1.2
12NR03201 plant community 1.2
12SN00602 plant community 1.2
12SN00605 plant community 1.2
12SN01501 plant community 1.2
12SS03103 plant community 1.2
14AK2903301 plant community 1.2
2015AK290723 plant community 1.2

Other references

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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:**
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17. **Perennial plant reproductive capability:**
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