USDA Natural Resources
Conservation Service

Ecological site R236XY118AK
Boreal Graminoid Loamy Flood Plains

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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.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 236X–Bristol Bay-Northern Alaska Peninsula Lowlands

MLRA 236 is in the western region of Alaska. It covers approximately 19,575 square miles and extends inland from Bristol Bay. It is defined by an expanse of nearly level to rolling lowlands, uplands, and low to moderate hills bordered by long footslopes of mountains. The climate near the coast is dominantly maritime, but the weather systems of Interior Alaska may have a strong influence on inland areas. The entire MLRA was covered by glacial ice during the early to middle Pleistocene. MLRA 236 is dominantly sparsely populated, undeveloped wildland. The communities of Dillingham and King Salmon and other villages are in the MLRA.

Ecological site concept

Information about the ecological site concept is in the "Ecological Dynamics" section.

This report provides baseline inventory data for the vegetation in this ecological site. Future 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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Rubus arcticus*
Herbaceous	(1) *Calamagrostis canadensis* (2) *Galium boreale*

Physiographic features

Information about the physiographic features is in the "Ecological Dynamics" section.

Table 2. Representative physiographic features

Landforms	(1) Flood plain
Elevation	0–67 m
Slope	0–5%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Influencing water features

Information about the water features is in the "Ecological Dynamics" section.

Soil features

Information about the soil features is in the "Ecological Dynamics" section. More in-depth soils information is in the soil survey reports.

Ecological dynamics

This boreal ecological site is on levees of lowland flood plains. Elevation typically ranges from sea level to 220 feet above sea level, and slopes are 0 to 5 percent. Slope aspect does not influence the plant community dynamics of this site.

This ecological site is correlated to D36-Boreal grass loamy levees. This soil has a cryic temperature regime and a udic moisture regime. The saturated hydraulic conductivity is moderately high to a depth of 40 inches. The upper mineral horizon is slightly acid to very strongly acid (pH 6.1 to 4.9), and it has an organic matter content of 8 to 12 percent. The soil typically is moderately well drained. The annual precipitation is 24 to 35 inches, and the annual frost-free period is 85 to 140 days. The parent material is sandy and silty alluvium over sandy alluvium.

The reference community phase is typified by a bluejoint grass (*Calamagrostis canadensis*) meadow that has some low and dwarf shrubs and abundant forbs. Medium and regenerating paper birch (*Betula papyrifera*) and white spruce (*Picea glauca*) trees may be present. As compared to other ecological sites on boreal flood plains, this ecological site is unique because it is on levees. The levees are subject to periods of flooding that vary in duration, frequency, and strength from those in low, mid, and high positions of flood plains. The resulting dissimilarities in reference states and community phases makes use of unique ecological sites necessary.

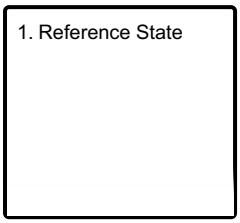
Flooding is the major disturbance regime for this ecological site; it is considered natural and typically is unmanaged. This site is subject to flooding because of the low elevation, minimal slope, and position on the lowland flood plains. Occasional, very brief periods of flooding occur in April through October. During the peak period of snowmelt (May and June), the water table typically is at a depth of 16 to 37 inches. The available background information suggests that the intensity of flooding and period since flooding occurred are critical in the distribution and abundance of vegetation in Alaskan riverine systems (Wohl, 2007). Flooding allows for plant succession by creating barren, moist areas for colonization, burying organic layers, adding nutrients to the soil, and depositing seed banks (Rood et al.,

2007; Yarie et al., 1998). Flooding of the levees creates an early community phase. The reference community phase rarely may not be flooded for a long period, and trees such as paper birch (*Betula papyrifera*) and white spruce (*Picea glauca*) may colonize and create a woodland community. When flooding occurs again, the post-reference community phase is expected to transition to the early flooding community phase.

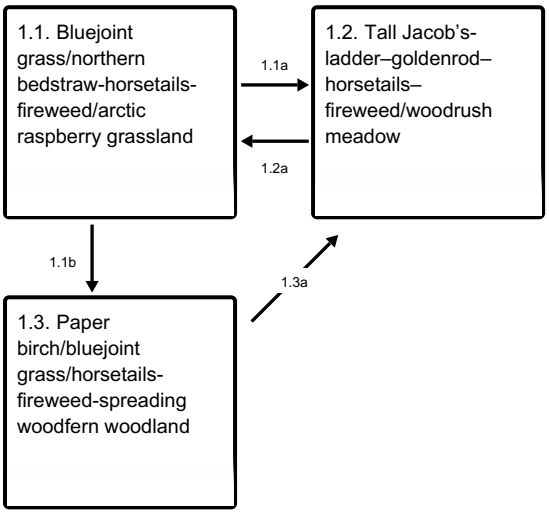
Slight browsing of forbs and willow by moose may occur in this ecological site, but it does not appear to affect the ecological processes significantly enough to alter the communities.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - Flooding.

1.1b - Rare, prolonged periods without flooding.

1.2a - Normal time and growth without disruptive flooding.

1.3a - Flooding.

State 1
Reference State

The reference state supports three community phases, which are grouped by the structure and dominance of the vegetation (e.g., trees, graminoids, and forbs) and by their ecological function and stability. The presence of these community phases is temporally dictated by occasional periods of flooding. The reference community phase is characterized by grassland interspersed with forbs and some shrubs. A transition to a post-reference community phase may occur when the reference community phase is not flooded for a longer period than normal. No alternate states have been observed.

Community 1.1
Bluejoint grass/northern bedstraw-horsetails-fireweed/arctic raspberry grassland

Figure 2. Typical area of community 1.1.

Community Phase Canopy Cover

(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
S	Arctic raspberry	*Rubus arcticus*	RUAR	71	10
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	85
F	Northern bedstraw	*Galium boreale*	GABO2	86	9
F	Fireweed	*Chamerion angustifolium*	CHAN9	71	5
F	Canada goldenrod	*Solidago canadensis*	SOCA6	71	4
F	Tall Jacob's-ladder	*Polemonium acutiflorum*	POAC	71	2
F	Seacoast angelica	*Angelica lucida*	ANLU	71	2
F	Horsetails	*Equisetum spp.*	EQUIS	71, 29, 43^	6, 10, 15

^ Horsetails (*Equisetum spp.*) are represented by three species—*E. arvense*, *E. pratense*, and *E. sylvaticum*, respectively.

Figure 3. Constancy and canopy cover of plants in community 1.1.

The reference community phase is characterized by grassland that includes various forbs and scattered shrubs. Typically, this community consists mainly of bluejoint grass (*Calamagrostis canadensis*) and scattered northern bedstraw (*Galium boreale*), horsetails (Equisetum spp.), fireweed (*Chamerion angustifolium*), Canada goldenrod (*Solidago canadensis*), and arctic raspberry (*Rubus arcticus*). Other species may include tealeaf willow (*Salix pulchra*), purple marshlocks (*Comarum palustre*), common cowparsnip (*Heracleum maximum*), and Canadian burnet (*Sanguisorba canadensis*). Mosses typically are in the ground cover (about 20 percent total mean cover). Other ground cover commonly includes herbaceous litter (about 85 percent) and woody litter (about 2 percent). About 2 percent is bare soil.

Community 1.2
Tall Jacob's-ladder–goldenrod–horsetails–fireweed/woodrush meadow

Figure 4. Typical area of community 1.2.

Community Phase Canopy Cover

(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
S	Arctic raspberry	*Rubus arcticus*	RUAR	100	5
G	Woodrushes	*Luzula spp.*	LUZUL	50	25
F	Tall Jacob's-ladder	*Polemonium acutiflorum*	POAC	100	15
F	Woodland horsetail	*Equisetum sylvaticum*	EQSY	100	5
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	5
F	Violets	*Viola spp.*	VIOLA	100	2

Figure 5. Constancy and canopy cover of plants in community 1.2.

The early flooding community phase is characterized by a forb meadow. Typically, this community consists tall Jacob's-ladder (*Polemonium acutiflorum*), horsetails (Equisetum spp.), fireweed (*Chamerion angustifolium*), violets (Viola spp.), arctic raspberry (*Rubus arcticus*), and woodrushes (Luzula spp.). Other species include Bering chickweed (*Cerastium beeringianum*), goldenrod (Solidago spp.), tealeaf willow (*Salix pulchra*), and bedstraws (Galium spp.). Mosses commonly are in the ground cover (about 25 percent total mean cover). Other ground cover commonly includes herbaceous litter (about 80 percent cover) and woody litter (about 1 percent). About 1 percent is bare soil. Note: The vegetation and soils for this community were sampled at two locations. Due to the limited data available, personal field observations were used to aid in describing this plant community.

Community 1.3
Paper birch/bluejoint grass/horsetails-fireweed-spreading woodfern woodland

Figure 6. Typical area of community 1.3.

Community Phase Canopy Cover

(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
T	Paper birch	*Betula papyrifera*	BEPA	100	10^
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	45
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	25
F	Woodland horsetail	*Equisetum sylvaticum*	EQSY	100	20
F	Spreading woodfern	*Dryopteris expansa*	DREX2	100	10

^ Tall, medium, and stunted individuals are counted as canopy trees. Regenerative individuals are not included.

Figure 7. Constancy and canopy cover of plants in community 1.3.

The post-reference community phase is characterized by open woodland that has graminoids and forbs in the understory and in open areas. Typically, this community consists mainly of paper birch (*Betula papyrifera*). Bluejoint grass (*Calamagrostis canadensis*) and diverse forbs, including fireweed (*Chamerion angustifolium*), spreading woodfern (*Dryopteris expansa*), and horsetails (Equisetum spp.), are in the understory and in non-treed areas. Various other species may include boreal yarrow (*Achillea millefolium* var. borealis), Rocky Mountain goldenrod (*Solidago multiradiata*), western water hemlock (*Cicuta douglasii*), Northern bedstraw (*Galium boreale*), Lapland cornel (*Cornus suecica*), and Barclay's willow (*Salix barclayi*). The ground cover is dominantly herbaceous litter (about 90 percent total mean cover) and some woody litter (about 20 percent) and mosses (about 10 percent). Note: The vegetation and soils for this community were sampled at one location. Due to the limited data available, personal field observations were used to aid in describing this plant community.

Pathway 1.1a
Community 1.1 to 1.2

Bluejoint grass/northern bedstraw-horsetails-fireweed/arctic raspberry grassland

Tall Jacob's-ladder–goldenrod–horsetails–fireweed/woodrush meadow

Flooding. Major flooding can inundate the natural levees, scouring the vegetation and soil and depositing sediment and a new seed bank. The resulting lack of competition for light and space allows for establishment of pioneer (disturbance-loving), hydrophilic forbs and graminoids, particularly species that have seeds that can be dispersed by wind or water. Very brief, occasional periods of flooding occur in April through October. The specific frequency and duration of flooding required to initiate a transition currently is unknown.

Pathway 1.1b
Community 1.1 to 1.3

Bluejoint grass/northern bedstraw-horsetails-fireweed/arctic raspberry grassland

Paper birch/bluejoint grass/horsetails-fireweed-spreading woodfern woodland

Rare, prolonged periods without flooding. If the reference community phase is not flooded for long periods, slower growing, less hydrophilic species such as shrubs and trees may colonize. This transition likely is rare, because the more common frequent periods of flooding prevent tall shrubs and trees from colonizing and reproducing.

Pathway 1.2a
Community 1.2 to 1.1

Tall Jacob's-ladder–goldenrod–horsetails–fireweed/woodrush meadow

Bluejoint grass/northern bedstraw-horsetails-fireweed/arctic raspberry grassland

Natural succession: Normal time and growth without disruptive flooding. Over time, competitive graminoids will colonize in the meadow and may outcompete forbs for space and light. Shrubs may also colonize but generally at a much slower rate than graminoids. The period needed for this transition currently is unknown. It likely depends at

least partially on the rates of colonization and growth of graminoids, particularly bluejoint grass (*Calamagrostis canadensis*).

Pathway 1.3a
Community 1.3 to 1.2

Paper birch/bluejoint grass/horsetails-fireweed-spreading woodfern woodland

Tall Jacob's-ladder–goldenrod–horsetails–fireweed/woodrush meadow

Flooding. The normal flooding regime, which consists of occasional, brief periods of flooding, may result in scouring and drowning of extant vegetation. The lack of competition for light and space may allow fast-growing, hydrophilic, pioneer graminoids and forbs to colonize and thrive. The period needed for this transition is unknown.

Additional community tables

Other references

Rood, S.B., L.A. Goater, J.M. Mahoney, C.M. Pearce, and D.G. Smith. 2007. Floods, fire, and ice: Disturbance ecology of riparian cottonwoods. Canadian Journal of Botany 85(11): 1,019-1,032.

Wohl, E.E. 2007. Review of effects of large floods in resistant-boundary channels. In Gravel-Bed Rivers VI: From Process Understanding to River Restoration, Volume 11. H. Habersack, H. Piégay, and M. Rinaldi, editors. Elsevier Science, Amsterdam. Pages 181-211.

Yarie, J., L. Viereck, K. Van Cleve, and P. Adams. 1998. Flooding and ecosystem dynamics along the Tanana River. BioScience 48(9): 690-695.

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Approval

Kirt Walstad, 2/13/2024

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	05/18/2024
Approved by	Kirt Walstad

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:

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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:**
