USDA Natural Resources Conservation Service

Ecological site F236XY150AK
Boreal Forest Loamy Wet Flood Plains

Last updated: 2/13/2024
Accessed: 05/15/2024

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): 236X–Bristol Bay-Northern Alaska Peninsula Lowlands

MLRA 236 is in southwest Alaska. It covers 19,575 square miles (USDA–NRCS, 2006) and extends inland from Bristol Bay. It is composed primarily of level to rolling plains and low to moderate hills bordered by long footslopes of mountains (Kautz et al., 2012). The flood plains and terraces along the major rivers and lakes are characterized by depressions and small basins. Mountains form the eastern and western borders of the MLRA, and glacially formed lakes are behind terminal moraines (Kautz et al., 2012). The entire MLRA was covered by glacial ice during the early to middle Pleistocene (USDA–NRCS, 2006).

The climate near the coast is dominantly maritime, and the climate farther inland is continental and is influenced by weather systems of Interior Alaska (Kautz et al., 2012). Summers typically are warm and short, and winters are long and cold. The average annual precipitation is 13 to 50 inches, and the average annual air temperature is 30 to 36 degrees F (Kautz et al., 2012). The freeze-free period normally is 70 to 125 days. Aspect and elevation, which ranges from sea level to about 2,500 feet above sea level (USDA–NRCS, 2006), influence the climate and weather patterns.

This MLRA is sparsely populated. The major communities include Dillingham, Naknek, and King Salmon. Federally managed land in the MLRA includes parts of Katmai National Park and Preserve and the Aniakchak National Monument and Preserve as well as Togiak and Alaska Peninsula National Wildlife Refuges (Kautz et al., 2012; USDA–NRCS, 2006).

Ecological site concept

This boreal ecological site is on high flood plains of lowlands. This site is in concave areas of high flood plains and in convex to linear areas of high flood plains that are surrounded by wetlands. The soils associated with this site are wet during the growing season as a result of ponding, which affects the plants that can reproduce successfully. Many of the plants are facultative or obligate wetland species. The reference plant community is a forest of mixed birch (Betula spp.) and white spruce (*Picea glauca*) that has an understory of hydrophilic and shade-loving shrubs and forbs, bluejoint (*Calamagrostis canadensis*), and abundant moss.

Associated sites

F236XY111AK	**Boreal Forest Loamy Flood Plains** Sites F236XY150AK and F236XY111AK (Boreal Forest Loamy Flood Plains) are both on high flood plains of lowlands, but site F236XY111AK is associated with well drained soils. Differences in the natural drainage class of the soils, frequency of ponding, and proximity to wetlands lead to dissimilar disturbance regimes, reference states, and community phases, making the use of unique ecological sites necessary.

Similar sites

F236XY111AK	**Boreal Forest Loamy Flood Plains** Sites F236XY150AK and F236XY111AK (Boreal Forest Loamy Flood Plains) are both on high flood plains of lowlands, but site F236XY111AK is not in concave areas and is associated with well drained soils. Differences in the shape of the slope, natural drainage class of the soils, frequency of ponding, and proximity to wetlands lead to dissimilar disturbance regimes, reference states, and community phases, making the use of unique ecological sites necessary.

Table 1. Dominant plant species

Tree	(1) *Betula papyrifera var. kenaica* (2) *Picea glauca*
Shrub	(1) *Spiraea stevenii* (2) *Rubus chamaemorus*
Herbaceous	(1) *Calamagrostis canadensis* (2) *Equisetum sylvaticum*

Physiographic features

The site characteristics specifically relate to the reference plant community phase. Each ecological site has a specific set of site characteristics and disturbance dynamics that results in unique composition, structure, and function of the plant community. Site characteristics (climate, geology, topography, and soil characteristics) are dynamic across a landscape. Subtle changes in site characteristics can result in a different plant community phase or ecological site. Definitions of site characteristics are provided in the United States Department of Agriculture Handbook 296 (USDA–NRCS, 2006), Geomorphic Description System (Schoeneberger and Wysocki, 2012), Field Book for Describing and Sampling Soils (Schoeneberger et al., 2012), and Soil Survey Manual (Soil Science Division Staff, 2017).

Table 2. Representative physiographic features

Geomorphic position, flats	(1) Talf
Slope shape across	(1) Convex (2) Linear (3) Concave
Landforms	(1) Plains > Flood plain
Flooding frequency	None to very rare
Ponding duration	Brief (2 to 7 days)
Ponding frequency	Occasional
Elevation	0–268 m
Slope	0–3%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Climate of land resource region (LRR): Maritime continental (Western Regional Climate Center, 2017); short, warm summers and long, cold winters (USDA–NRCS, 2006).

Climate of major land resource area (MLRA): Maritime by the coast; continental inland and at higher elevations (influenced by Interior Alaska weather systems). The average annual precipitation is 13 to 50 inches, and the average annual air temperature is 30 to 36 degrees F (USDA–NRCS, 2006).

Table 3. Representative climatic features

Frost-free period (characteristic range)	85-140 days
Freeze-free period (characteristic range)	

Precipitation total (characteristic range)	

Influencing water features

Soil features

This ecological site is correlated to D36-Boreal forest loamy flood plains, wet. This soil has a cryic temperature regime and an aquic moisture regime. The saturated hydraulic conductivity is moderately low to a depth of 40 inches. The upper mineral horizon is extremely acid or very strongly acid (pH 3.8 to 4.6), and it has an organic matter content of 65 to 85 percent. The annual frost-free period is 85 to 140 days. The parent material consists of herbaceous organic material over coarse-silty alluvium.

Table 4. Representative soil features

Parent material	(1) Alluvium
Drainage class	Poorly drained
Permeability class	Slow

Ecological dynamics

Overview

This boreal ecological site is on high flood plains of lowlands. It is in concave areas of high flood plains and in convex to linear areas of high flood plains that are surrounded by wetlands. The soils associated with this site are wet during the growing season as a result of ponding, which affects the plants that can reproduce successfully. The reference state contains one documented community. The reference plant community is a closed forest of mixed birch (Betula spp.) and white spruce (*Picea glauca*) that has an understory of hydrophilic and shade-loving shrubs and forbs, bluejoint (*Calamagrostis canadensis*), and abundant moss.

Disturbance Dynamics

Flooding, Ponding, and Water Table
This site is subject to flooding and ponding, but an early community phase was not documented. The soils associated with the site are wet during the growing season because of the slope shape and the proximity to wetlands. The frequency of flooding is very rare; it likely only occurs during peak snowmelt in April and May. A typical low-energy flood will not scour the vegetation, so the overstory and understory vegetation will remain. The site is subject to occasional, brief periods of ponding in April through September. The wide range of plants in the reference community phase, including facultative upland species to obligate wetland species, are resilient to brief periods of ponding.

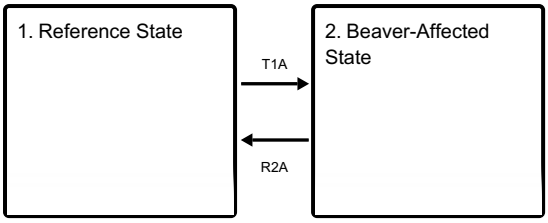
Other Observations

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

Damming of a nearby waterway by beavers (Castor canadensis) transitions the community to an alternate state. Hydrophilic graminoids, forbs, and shrubs typically surround the ponded areas upstream from beaver dams.

State and transition model

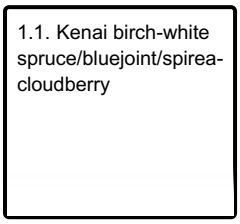
Ecosystem states



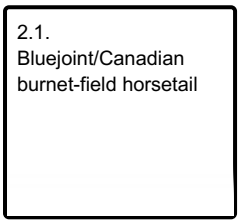
T1A - Beaver activity.

R2A - Removal of beavers.

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The reference state supports one community phase, which is distinguished by the developed structure and dominance of the vegetation and by its ecological function and stability. The reference community phase is a closed mixed forest (Viereck et al., 1992). This report provides baseline inventory data for the vegetation. Future data collection is needed to provide further information about existing plant communities and the disturbance regimes that result in transitions from one community to another. Common and scientific names are from the USDA PLANTS database. Community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1
Kenai birch-white spruce/bluejoint/spirea-cloudberry

Figure 1. Typical area of community 1.1.

Community Phase 1.1 Canopy Cover Table

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

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
T	White spruce	*Picea glauca*	PIGL	217^	25^
T	Kenai birch	*Betula papyrifera* var. *kenaica*	BEPAK	117^	40^
S	Beauverd spirea	*Spiraea stevenii*	SPST3	100	15
S	Cloudberry	*Rubus chamaemorus*	RUCH	83	6
S	Tealeaf willow	*Salix pulchra*	SAPU15	67	5
S	Lingonberry	*Vaccinium vitis-idaea*	VAVI	67	10
G	Bluejoint	*Calamagrostis canadensis*	CACA4	100	40
F	Spreading woodfern	*Dryopteris expansa*	DREX2	83	15
F	Purple marshlocks	*Comarum palustre*	COPA28	67	8
F	Horsetails	*Equisetum spp.*	EQUIS~	50, 83	15, 15
M	Feathermosses	Includes 3 genera		50, 50, 50#	9, 15, 10

* Trees may be present in multiple strata within one plot; therefore, it is possible for species of this plant group to have a constancy value of more than 100 percent.

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

~ Horsetails (*Equisetum spp.*) are represented by two species: *E. arvense* and *E. sylvaticum*, respectively.

Feathermosses are represented by three species: *Hylocomium splendens*, *Pleurozium schreberi*, and *Ptilium crista-castrensis*, respectively.

This dataset includes data from 35 sample plots. The sample plots are distributed across the survey area and are independent of one another.

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

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

Figure 2. Frequency and canopy cover of plants in community 1.1.

The reference plant community phase is a closed mixed forest that has an understory of patchy, dense shrubs, graminoids, and forbs. This community typically consists of an overstory of Kenai birch (*Betula papyrifera* var. kenaica) and white spruce (*Picea glauca*) and an understory of spirea (*Spiraea stevenii*), cloudberry (*Rubus chamaemorus*), lingonberry (*Vaccinium vitis-idaea*), bluejoint (*Calamagrostis canadensis*), spreading woodfern (*Dryopteris expansa*), and horsetails (Equisetum spp.). Other species may include tealeaf willow (*Salix pulchra*), alder (Alnus spp.), purple marshlocks (*Comarum palustre*), fireweed (*Chamerion angustifolium*), and sedges (Carex spp.). Paper birch (*Betula papyrifera*) and Alaska paper birch (*Betula neoalaskana*) may be present. Mosses are abundant in the ground cover, including sphagnum mosses (Sphagnum spp.) and feathermosses (*Hylocomium splendens*, *Ptilium crista-castrensis*, and *Pleurozium schreberi*). Lichens, if any, normally are a minor component in the community. Other ground cover commonly includes herbaceous litter and woody litter. Small areas are covered by water or are bare soil.

Dominant plant species

- white spruce (*Picea glauca*), tree
- Kenai birch (*Betula papyrifera var. kenaica*), tree
- beauverd spirea (*Spiraea stevenii*), shrub
- cloudberry (*Rubus chamaemorus*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- spreading woodfern (*Dryopteris expansa*), other herbaceous
- purple marshlocks (*Comarum palustre*), other herbaceous
- horsetail (*Equisetum*), other herbaceous
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- Schreber's big red stem moss (*Pleurozium schreberi*), other herbaceous
- knights plume moss (*Ptilium crista-castrensis*), other herbaceous

State 2

Beaver-Affected State

This alternate state results from ponding of areas upstream from beaver dams. Beavers (Castor canadensis) directly kill trees and large shrubs for food and construction of dams, and they indirectly kill trees and other species by raising the water table (USDA–FS, 2013). Ponding generally results in a vegetative community different from the one normally on these flood plains. This plant community commonly includes resilient individuals extant in the reference community phase and pioneer hydrophilic species. The permanent ponding associated with areas upstream of beaver dams commonly negates the influence of flooding on the soils and vegetation. This vegetative community is likely to remain relatively stable until the dam is removed. Browsing by moose may occur in this alternate state, but it does not appear to affect the ecological processes significantly enough to alter the community.

Community 2.1
Bluejoint/Canadian burnet-field horsetail

Figure 3. Typical area of community 2.1.

Community Phase 2.1 Canopy Cover Table

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

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
T	White spruce	*Picea glauca*	PIGL	200*	1^
S	Arctic raspberry	*Rubus arcticus*	RUAR	100	15
S	Resin birch	*Betula glandulosa*	BEGL	100	5
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	70
F	Canadian burnet	*Sanguisorba canadensis*	SACA14	100	20
F	Field horsetail	*Equisetum arvense*	EQAR	100	10
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	6

* Trees may be present in multiple strata within one plot; therefore, it is possible for species of this plant group to have a constancy value of more than 100 percent.

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

This dataset includes data from 1 sample plot. The sample plots are distributed across the survey area and are independent of one another. Due to the limited data available for this community phase, personal field observations were also used to aid in describing the vegetative community.

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 4. Frequency and canopy cover of plants in community 2.1.

This community phase is associated with areas surrounding beaver ponds. It is characterized by grassland that has

shrubs and individual regenerating trees throughout. Typically, this community consists dominantly of bluejoint with arctic raspberry, resin birch (*Betula glandulosa*), Canadian burnet (*Sanguisorba canadensis*), field horsetail, and fireweed throughout. Birch (Betula spp.) and white spruce trees may be present, but typically only regenerating individuals. Other species may include creeping sedge (*Carex chordorrhiza*), tall cottongrass (*Eriophorum angustifolium*), and willows (Salix spp.). The cover of moss typically is high, but lichens are not in these wet areas. Other ground cover generally includes herbaceous litter and woody litter.

Dominant plant species

- arctic raspberry (*Rubus arcticus*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- Canadian burnet (*Sanguisorba canadensis*), other herbaceous
- field horsetail (*Equisetum arvense*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous

Transition T1A
State 1 to 2

A transition to an alternate state occurs when a water source is dammed by beavers. Areas surrounding beaver ponds may support plant assemblages distinctly different from those typically on these high flood plains. The vegetative community generally is comprised of species that are water tolerant and can reproduce in wet soils. These areas may be susceptible to flooding or ponding after periods of rainfall and snowmelt. This prevents nonhydrophilic species from establishing and keeps the composition of the plant community relatively stable. The period needed for this transition depends on the presence and activity of beavers.

Restoration pathway R2A
State 2 to 1

Restoration of this site begins with the removal of the beaver dam. Further development such as plantings may be needed. It is unknown whether the natural removal of a beaver dam will lead to a return of the area to the reference state. Further research and in situ documentation is needed to fully describe this transition.

Additional community tables

Other references

Kautz, D.R., P. Taber, and S. Nield (editors). 2004. Land resource regions and major land resource areas of Alaska. U.S. Department of Agriculture, Natural Resources Conservation Service, Palmer, AK. Revised 2012.

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, NE.

Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils. Version 3.0. U.S. Department of Agriculture, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

Soil Science Division Staff. 2017. Soil survey manual. Ditzler, C., K. Scheffe, and H.C. Monger, editors. U.S. Department of Agriculture Handbook 18. Government Printing Office, Washington, D.C.

U.S. Department of Agriculture, Forest Service, Alaska Region. 2013. Forest health conditions in Alaska - 2012. Publication R10-PR-32.

U.S. 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 Research Station General Technical Report PNW-

GTR-286. Portland, OR.

Contributors

Phil Barber
Michael Margo
Sue Tester
Kendra Moseley
Stephanie Schmit

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	05/15/2024
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):**

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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:**