USDA Natural Resources Conservation Service

Ecological site F236XY114AK
Boreal Forest Loamy Wet, Steep Slopes

Last updated: 2/13/2024
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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 foot slopes 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.

Associated sites

F236XY113AK	**Boreal Forest Loamy Steep Slopes** Ecological site F236XY113AK (Boreal Forest Loamy Slopes, Steep) is on boreal upland escarpments, but it is in linear to convex areas. This leads to differences in the natural drainage class, runoff potential, and depth to the water table in the soils as compared to site F236XY114AK.

Table 1. Dominant plant species

Tree	(1) *Betula papyrifera var. kenaica* (2) *Betula papyrifera*
Shrub	(1) *Alnus viridis subsp. sinuata* (2) *Rubus chamaemorus*
Herbaceous	(1) *Calamagrostis canadensis* (2) *Equisetum arvense*

Physiographic features

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

Table 2. Representative physiographic features

Landforms	(1) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	0–125 m
Slope	15–60%
Aspect	NE, E, 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.

Ecological dynamics

This boreal ecological site is on linear to concave areas of upland escarpments. It typically is at sea level to an elevation of 410 feet, and it has slopes of 15 to 60 percent. The site generally is on northeast- to southwest-facing slopes of the bluff along the Nushagak River (about 40 to 220 degrees).

This ecological site is correlated to D36-Boreal forest sandy colluvial slopes, wet. This soil has a cryic temperature regime and a udic moisture regime. The saturated hydraulic conductivity is moderately low to a depth of 40 inches. The upper mineral horizon is very strongly acid to slightly acid (pH 4.7 to 6.2), and it has an organic matter content of 7 to 9 percent. The soil is somewhat poorly drained. The runoff potential is medium. The annual precipitation is 24 to 35 inches, and the annual frost-free period is 85 to 140 days. The soil formed in sandy colluvium over gravelly slide deposits.

The reference community phase is characterized by a birch forest and an understory of various shrubs, forbs, and bluejoint grass (*Calamagrostis canadensis*). Ecological site F236XY113AK (Boreal Forest Loamy Slopes, Steep) is also on boreal upland escarpments, but it is in linear to convex areas. Differences in the natural drainage class, runoff potential, and depth to the water table in the soil leads to dissimilarities in the reference states and

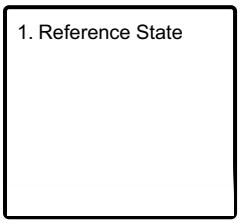
community phases, which makes use of separate ecological sites necessary.

Erosion caused by windthrow and landslides is the major documented disturbance regime; it is considered natural and typically is unmanaged. The steep escarpments are susceptible to landslides, and the trees may be susceptible to windthrow. The available background information shows that small-scale windthrow results in the snapping of boles and uprooting of trees. Susceptibility commonly is related to the age and height of the trees, rooting depth, and saturation of the soils (USDA-FS, 2013). Most or all of the extant vegetation may be removed. Because this site is in concave areas, surface runoff accumulates and seepage occurs. The site is inherently wet (mainly during snowmelt), particularly as compared to site F236XY113AK. This affects the composition of the plant communities.

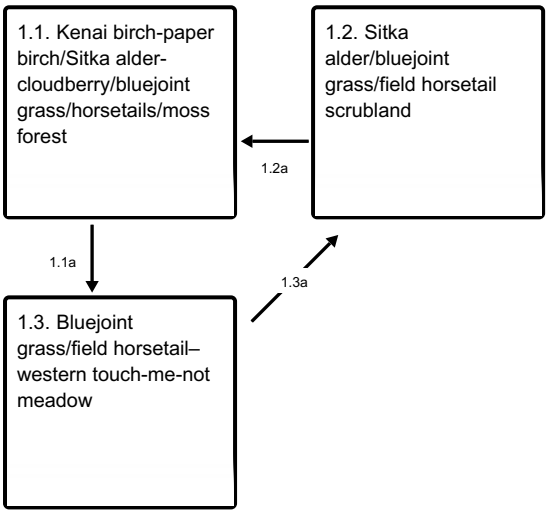
Slight or moderate browsing by moose on various plants may occur in this site, but it does not appear to affect the ecological processes significantly enough to alter the communities.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - Erosion from landslides or windthrow.

1.2a - Natural succession: Normal time and growth without disruptive erosion.

1.3a - Natural succession: Normal time and growth without disruptive erosion.

State 1
Reference State

The reference state supports three community phases, which are grouped by the structure and dominance of the vegetation (trees, shrubs, graminoids, and forbs) and by their ecological function and stability. The reference community phase is characterized by a birch forest and diverse understory that commonly consists of water-tolerant shrubs, graminoids, and forbs. The presence of the community phases is dictated temporally by erosion and the movement of surface or subsurface water. No alternate states have been observed.

Community 1.1
Kenai birch-paper birch/Sitka alder-cloudberry/bluejoint grass/horsetails/moss forest

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)
T	Paper birch	*Betula papyrifera*	BEPA	100	7'
T	Kenai birch	*Betula papyrifera* var. *kenaica*	BEPAK	100	45'
S	Cloudberry	*Rubus chamaemorus*	RUCH	100	20
S	Sitka alder	*Alnus viridis* ssp. *sinuata*	ALVIS	100	20
S	Lapland cornel	*Cornus suecica*	COSU4	100	10
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	30
F	Field horsetail	*Equisetum arvense*	EQAR	100	20

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

Figure 3. Constancy and canopy cover of plant species in community 1.1.

The reference community phase is characterized by a birch forest and diverse understory that commonly consists of water-tolerant shrubs, graminoids, and forbs. Trees commonly are in the medium or regenerative stratum. Typically, the community consists of paper birch (*Betula papyrifera*) or Kenai birch (*Betula papyrifera* var. kenaica) and an understory of Sitka alder (*Alnus viridis* ssp. sinuata), cloudberry (*Rubus chamaemorus*), bluejoint grass (*Calamagrostis canadensis*), and horsetails (*Equisetum arvense*, *E. sylvaticum*). Other extant species may include fireweed (*Chamerion angustifolium*), sweetgale (*Myrica gale*), tufted hairgrass (*Deschampsia cespitosa*), and Lapland cornel (*Cornus suecica*). Many of the plants are facultative or obligate wetland species, which is indicative of the wetness of the concave areas. A high density of mosses, particularly hydrophilic sphagnum mosses (Sphagnum spp.), is present (about 60 percent cover). Other ground cover includes herbaceous litter (about 45 percent cover) and woody litter (about 3 percent). Note: The vegetation and soils of this community were sampled at two locations. Due to the limited data available, personal field observations were used to aid in describing the plant community.

Community 1.2
Sitka alder/bluejoint grass/field horsetail scrubland

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	Sitka alder	*Alnus viridis* ssp. *sinuata*	ALVIS	100	65
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	45
F	Field horsetail	*Equisetum arvense*	EQAR	100	15
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	5
F	Spreading woodfern	*Dryopteris expansa*	DREX2	50	7

Figure 5. Constancy and canopy cover of plant species in community 1.2.

The late erosional community phase is characterized by scrubland consisting of Sitka alder (*Alnus viridis* ssp. sinuata) and an understory of bluejoint grass (*Calamagrostis canadensis*), field horsetail (*Equisetum arvense*), and fireweed (*Chamerion angustifolium*). Ladyfern (*Athyrium filix-femina*), spreading woodfern (*Dryopteris expansa*), and regenerative Alaska birch (*Betula neoalaskana*) and Kenai birch (*Betula papyrifera* var. kenaica) are present. The total moss cover varies (about 45 percent). Other ground cover typically includes herbaceous litter (about 80 percent). About 7 percent is bare soil. Note: The vegetation and soils associated with this community were sampled at two locations. Due to the limited data available, personal field observations were used to aid in describing the plant community.

Community 1.3
Bluejoint grass/field horsetail–western touch-me-not meadow

Figure 6. Typical area of community 1.3.

Community Phase Canopy Cover

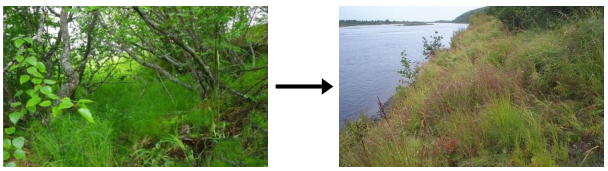
(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	45
F	Field horsetail	*Equisetum arvense*	EQAR	100	35
F	Western touch-me-not	*Impatiens noli-tangere*	IMNO	100	15
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	7
F	Tall Jacob's-ladder	*Polemonium acutiflorum*	POAC	100	3

Figure 7. Constancy and canopy cover of plant species in community 1.3.

This early erosional community phase is characterized by a mixed graminoid and forb meadow. Typically, it consists of bluejoint grass (*Calamagrostis canadensis*), field horsetail (*Equisetum arvense*), western touch-me-not (*Impatiens noli-tangere*), and fireweed (*Chamerion angustifolium*). Other species such as fringed willowherb (*Epilobium ciliatum* ssp. glandulosum) and colonizing alders (Alnus spp.) may be present. These recently disturbed areas typically support myriad types of ground cover, including mosses and herbaceous litter. Areas of surface rock fragments, bare soil, and surface water also are common. Note: The vegetation and soils associated with this plant community phase 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 1.3



Kenai birch-paper birch/Sitka alder-cloudberry/bluejoint grass/horsetails/moss forest

Bluejoint grass/field horsetail–western touch-me-not meadow

Erosion from landslides or windthrow. These steeply sloping escarpments may be susceptible to landslides, and the medium and tall trees may be susceptible to windthrow. These disturbances can create nonvegetated areas in which fast-growing, pioneer plants may become established. The erosional processes may be induced or further compounded by the wetness of the soils. The time frame for these disturbances is unknown, but windthrow generally depends on a variety of factors, including tree height, rooting depth, and windspeed.

Pathway 1.2a

Community 1.2 to 1.1

Sitka alder/bluejoint grass/field horsetail scrubland

Kenai birch-paper birch/Sitka alder-cloudberry/bluejoint grass/horsetails/moss forest

Natural succession: Normal time and growth without disruptive erosion. As the effect of the landslides or windthrow subsides, deciduous trees will colonize and reproduce and eventually replace alder as the dominant overstory species. The understory typically will open, allowing for a mix of competitive, commonly hydrophilic shrubs, forbs, and graminoids to colonize and thrive. The period needed for this transition currently is unknown, but it likely depends partially on the rates of colonization and growth of trees. This transition may be slowed temporally and plant colonization may be affected spatially by seepage and runoff.

Pathway 1.3a
Community 1.3 to 1.2

Bluejoint grass/field horsetail–western touch-me-not meadow

Sitka alder/bluejoint grass/field horsetail scrubland

Natural succession: Normal time and growth without disruptive erosion. Over time, the landform likely will stabilize and organic matter will be added to the soils from senescent colonizers. Nitrogen-fixing alders may colonize, creating a dense overstory sufficient for supporting shade-tolerant forbs and graminoids. The period needed is unknown, but it likely depends partially on the rates of colonization and reproduction of alder and the proximity of seed sources. Runoff and seepage may temporally slow this transition.

Additional community tables

Other references

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

Contributors

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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:**
