USDA Natural Resources
Conservation Service

Ecological site F236XY117AK
Boreal Forest Wet Loamy Plain Drainageways

Last updated: 2/13/2024
Accessed: 05/19/2024

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.

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

The Bristol Bay-Northern Alaska Peninsula Lowland Major Land Resource Area (MLRA 236) is located in Western Alaska. This MLRA covers approximately 19,500 square miles and is defined by an expanse of nearly level to rolling lowlands, uplands and low to moderate hills bordered by long, mountain footslopes. Major rivers include the Egegik, Mulchatna, Naknek, Nushagak, and Wood River. MLRA 236 is in the zone of discontinuous permafrost. It is primarily in areas with finer textured soils on terraces, rolling uplands and footslopes. This MLRA was glaciated during the early to middle Pleistocene. Moraine and glaciofluvial deposits cover around sixty percent of the MLRA. Alluvium and coastal deposits make up a large portion of the remaining area (Kautz et al., 2012; USDA, 2006).

Climate patterns across this MLRA shift as one moves away from the coast. A maritime climate is prominent along the coast, while continental weather, commonly associated with Interior Alaska, is more influential inland. Across the MLRA, summers are general short and warm while winters are long and cold. Mean annual precipitation is 13 to 50 inches, with increased precipitation at higher elevations and areas away from the coast. Mean annual temperatures is between 30 and 36 degrees F (USDA, 2006).

The Bristol Bay-Northern Alaska Peninsula MLRA is principally undeveloped wilderness. Federally managed land includes parts of the Katmai and Aniakchak National Parks, and the Alaska Peninsula, Becharof, Togiak and Alaska Maritime National Wildlife Refuges. The MLRA is sparsely populated. Principal communities include Dillingham,

Naknek, and King Salmon. Commercial fishing in Bristol Bay and the Bering Sea comprises a major part of economic activity in the MLRA. Other land uses include subsistence activities (fishing, hunting, and gathering) and sport hunting and fishing (USDA, 2006).

Ecological site concept

This site is in plain drainageways. Site elevation ranges from 30 to 720 feet above sea level. Slope gradients are strongly sloping to moderately steep. Soil and site hydrology shape the vegetation in this landform. Late snowpack increases water availability at the start of the growing season. Flood events are low energy and do not scour soil or vegetation. Soils are somewhat poorly drained with a water table throughout the year between 15 and 24 inches. Most vegetation is categorized as facultative to obligate wetland species.

The reference state supports three communities. The reference community phase is characterized by a mixed forest (Viereck et al., 1992). It is composed of a mix of white spruce (*Picea glauca*) and paper birch (*Betula papyrifera*) with an understory of forbs, medium shrubs, and abundant moss.

Associated sites

F236XY115AK	**Boreal Forest Loamy Moist Slopes** F236XY115AK is a forested site on plains and hill backslopes. This site is found in drainageways that dissect those plains. F236XY115AK is associated with well drained soils that lack a water table and do not flood. The resulting ecological dynamics and supported vegetation are different than this site.
F236XY152AK	**Boreal Forest Volcanic Loamy Swales** F236XY152AK is found in swales on the same plains as the drainageways drainageways defined by this site. Site and soil hydrology result in different reference plant communities.
R236XY127AK	**Subarctic Sedge Peat Plain Depressions** R236XY127AK describes concave dips on plains. It and this site are found on the same plains. Concave dips contain organic soils associated with a meadow reference plant community that is distinct from the forest found on plain drainageways.

Similar sites

F236XY116AK	**Boreal Forest Loamy Wet Slopes** F236XY116AK is in linear to convex areas of boreal upland plains and hills. It and this site both support a mix of trees with a diverse understory of shrubs, forbs and graminoids. Differences in soil and site hydrology result in a reference community comprised of more hydrophytic species in this site.

Table 1. Dominant plant species

Tree	(1) *Picea glauca* (2) *Betula papyrifera*
Shrub	(1) *Salix pulchra* (2) *Myrica gale*
Herbaceous	(1) *Equisetum arvense* (2) *Calamagrostis canadensis*

Physiographic features

This site is in plain drainageways. Elevation ranges from 30 to 720 feet above sea level. Slope gradients are strongly to moderately steep (4 – 14 percent). This site very rarely floods and does not pond, with medium to high run-off. Aspect does not influence this site.

Table 2. Representative physiographic features

Landforms	(1) Plains > Drainageway
Runoff class	Medium to high
Flooding frequency	Very rare

Ponding frequency	None
Elevation	9–219 m
Slope	4–14%
Water table depth	38–61 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Medium to high
Flooding frequency	Very rare
Ponding frequency	None
Elevation	9–219 m
Slope	4–16%
Water table depth	38–61 cm

Climatic features

The climate of this site reflects that of the MLRA, which is described as maritime polar (EPA, 2013). Temperatures are moderated by the nearby Bristol Bay and norther Pacific bodies of water. Annual precipitation ranges from 21 – 34 inches with approximately 40 percent occurring during the June-September growing season (PRISM, 2018).

Table 4. Representative climatic features

Frost-free period (characteristic range)	75-100 days
Freeze-free period (characteristic range)	65-90 days
Precipitation total (characteristic range)	533-864 mm
Frost-free period (actual range)	75-100 days
Freeze-free period (actual range)	65-90 days
Precipitation total (actual range)	381-1,041 mm
Frost-free period (average)	90 days
Freeze-free period (average)	75 days
Precipitation total (average)	737 mm

Influencing water features

This site is influenced by riparian water features. The water path is loosely defined within the drainageway. Very rare flood events are low energy and do not scour soil or vegetation. The water system is best described as an intermittent riverine system with a vegetated or organic bottom (Cowardin et al., 1979). Precipitation and seasonal snow melt are the main sources of water.

Soil features

Soils are young and weekly developed Inceptisols (Soil Survey Staff, 2013). They are very deep and somewhat poorly drained. Soils support a cryic temperature regime and an aquic moisture regime. Parent material is comprised of organic material of alluvium over glaciolacustrine deposits.

Soil factors affecting vegetation include soil hydrology and high amounts of organic material. These aquic soils are somewhat poorly drained with a water table throughout the year between 15 and 24 inches. This restricts where trees can grow and also restricts the species found in the understory. Fibric and sapric soil materials in the top seven inches also restrict vegetation. These materials decompose slowly and aid in supporting a cool, moist

environments that also restricts vegetation.

Correlated soil components in the MLRA 236: Damcreek, E36-Boreal forest and woodland-silty wet till slopes

Table 5. Representative soil features

Parent material	(1) Glaciofluvial deposits
Surface texture	(1) Highly organic silt
Drainage class	Somewhat poorly drained
Permeability class	Slow
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	5.59–7.87 cm
Soil reaction (1:1 water) (0-25.4cm)	5.8–6.2
Subsurface fragment volume <=3" (Depth not specified)	9%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 6. Representative soil features (actual values)

Drainage class	Somewhat poorly drained
Permeability class	Slow
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	5.59–7.87 cm
Soil reaction (1:1 water) (0-25.4cm)	5.8–6.2
Subsurface fragment volume <=3" (Depth not specified)	9%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site is in plain drainageways. Local site factors including soil characteristics and local hydrology create three co-occurring plant communities. The reference community phase is typified by a mixed white spruce (*Picea glauca*) and paper birch (*Betula papyrifera*) forest and an understory of forbs, medium shrubs, and abundant moss.

Seepage is the main documented disturbance regime for this ecological site. Spatial patterns in soil and site hydrology shape the vegetation. The somewhat poorly drained soils support an aquic moisture regime and a year-round water table. All vegetation in these drainages are hydrophytic and often facultative to obligate wetland species.

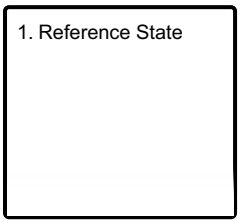
Vegetative patterns emerge based on hyperlocal soil water patterns. Driest areas are most likely to support the trees indicative of the reference plant community. The wettest areas, often found at microlow positions within the flood pathway, typically only support herbaceous species. Intermediate positions are too wet to support slow

growing trees but well drained enough to support shrubs. These areas are dominated by a mix of willows. The time period needed for site hydrology to shift enough to cause changes to the vegetative communities is unknown. Because flooding occurs very rarely, the effects of seepage likely depend on yearly and monthly variations in precipitation and snowmelt and on runoff.

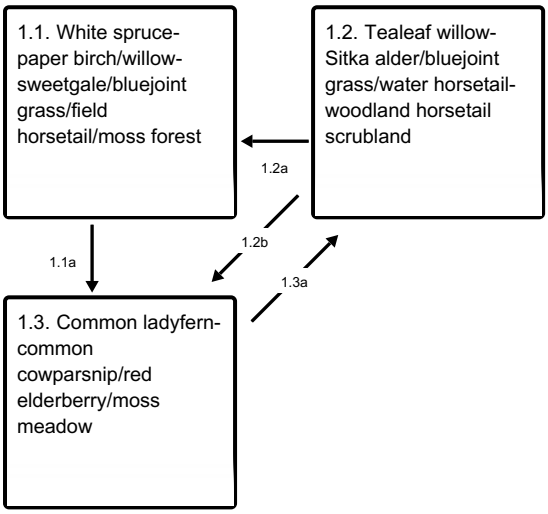
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - Seepage.

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

1.2b - Extended period of seepage.

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

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, shrubs, graminoids, and forbs) and by their ecological function and stability. The presence of these communities is temporally dictated by seepage associated with the linear to concave areas. The reference community phase is characterized by a mixed forest that has an understory of dominantly hydrophilic shrubs and forbs. No alternate states were observed.

Community 1.1
White spruce-paper birch/willow-sweetgale/bluejoint grass/field horsetail/moss forest

Figure 8. 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	200*	10^
T	White spruce	*Picea glauca*	PIGL	100	25^
S	Tealeaf willow	*Salix pulchra*	SAPU15	100	15
S	Sweetgale	*Myrica gale*	MYGA	100	10
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	10
F	Field horsetail	*Equisetum arvense*	EQAR	100	60
M	Feathermosses	Includes 2 genera		100, 100#	15, 35

* 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.

Feathermosses are represented by two species here—*Hylocomium splendens* and *Ptilium crista-castrensis*, respectively.

Figure 9. Constancy and canopy cover of plants in community 1.1.

The reference community phase is characterized by an open forest consisting of mixed deciduous and coniferous trees and an understory of dominantly hydrophilic shrubs, forbs, and graminoids. Typically, the overstory is paper birch (*Betula papyrifera*) and white spruce (*Picea glauca*) and the understory is facultative or obligate wetland species, including tealeaf willow (*Salix pulchra*), sweetgale (*Myrica gale*), field horsetail (*Equisetum arvense*), and bluejoint grass (*Calamagrostis canadensis*). Other understory species may include Lapland cornel (*Cornus suecica*), strawberryleaf raspberry (*Rubus pedatus*), Canadian burnet (*Sanguisorba canadensis*), and longawn sedge (*Carex macrochaeta*). Mosses, including feathermosses (*Ptilium crista-castrensis*, *Hylocomium splendens*) and sphagnum mosses (Sphagnum spp.), make up a large percentage of the ground cover (about 85 percent total mean cover). Other ground cover includes herbaceous litter (about 15 percent cover) and woody litter (about 10 percent). Note: The vegetation and soils for this community phase were sampled at one location. Due to the limited data available, personal field observations were used to aid in describing the plant community.

Community 1.2
Tealeaf willow-Sitka alder/bluejoint grass/water horsetail-woodland horsetail scrubland

Figure 10. 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	Tealeaf willow	*Salix pulchra*	SAPU15	100	10
S	Sitka alder	*Alnus viridis* ssp. *sinuata*	ALVIS	50	40
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	55
F	Violets	*Viola spp.*	VIOLA	100	Trace
F	Water horsetail	*Equisetum fluviatile*	EQFL	50	10

Figure 11. Constancy and canopy cover of plants in community 1.2.

The late seepage community phase is characterized by scrubland and water-tolerant graminoids and forbs. Typically, the community consists of tealeaf willow (*Salix pulchra*) and Sitka alder (*Alnus viridis* ssp. sinuata) scrubland and areas of bluejoint grass (*Calamagrostis canadensis*) and water-tolerant forbs such as horsetails (Equisetum spp.), violets (Viola spp.), and ferns. Other species may include Barclay's willow (*Salix barclayi*), cloudberry (*Rubus chamaemorus*), strawberryleaf raspberry (*Rubus pedatus*), and tall Jacob's-ladder (*Polemonium acutiflorum*). Medium and regenerative trees such as white spruce (*Picea glauca*) and Kenai birch (*Betula papyrifera* var. kenaica) may be present sporadically in this community. Sphagnum mosses (Sphagnum spp.) generally are in the ground cover (about 15 percent total mean cover). Other ground cover commonly includes herbaceous litter (about 85 percent cover) and woody litter (about 6 percent). 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 the plant community.

Community 1.3
Common ladyfern-common cowparsnip/red elderberry/moss meadow

Figure 12. Typical area of community 1.3.

Community Phase Canopy Cover

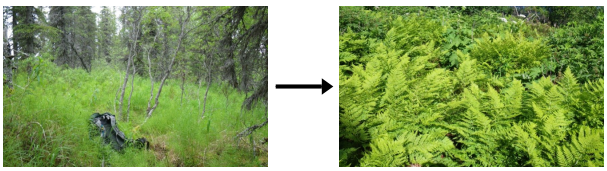
(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
S	Red elderberry	*Sambucus racemosa*	SARA2	100	30
F	Common ladyfern	*Athyrium filix-femina*	ATFI	100	50
F	Common cowparsnip	*Heracleum maximum*	HEMA80	100	40
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	5

Figure 13. Constancy and canopy cover of plants in community 1.3.

The early seepage community phase is characterized by a dense forb meadow consisting of common ladyfern (*Athyrium filix-femina*), common cowparsnip (*Heracleum maximum*), and fireweed (*Chamerion angustifolium*) and patches of red elderberry (*Sambucus racemosa*) and bluejoint grass (*Calamagrostis canadensis*) at the edges. Various other forbs include seacoast angelica (*Angelica lucida*), field horsetail (*Equisetum arvense*), Bering chickweed (*Cerastium beeringianum*), and larkspurleaf monkshood (*Aconitum delphiniifolium*). The ground cover consists dominantly of mosses (about 40 percent total mean cover) and herbaceous litter (about 80 percent). Note: The vegetation and soils for this community phase were sampled at one location. Due to the limited data available, personal field observations were used to aid in describing the plant community.

Pathway 1.1a
Community 1.1 to 1.3



White spruce-paper birch/willow-sweetgale/bluejoint grass/field horsetail/moss forest

Common ladyfern-common cowparsnip/red elderberry/moss meadow

Seepage. Seepage likely will drown susceptible plant species in the reference community phase, particularly trees and shrubs. Less competition for space and light may allow pioneer, hydrophilic forbs and graminoids to colonize. The frequency and duration of seepage required to initiate this transition is unknown.

Pathway 1.2a
Community 1.2 to 1.1

Tealeaf willow-Sitka alder/bluejoint grass/water horsetail-woodland horsetail scrubland

White spruce-paper birch/willow-sweetgale/bluejoint grass/field horsetail/moss forest

Natural succession: Normal time and growth without disruptive seepage. Over time, trees such as white spruce and paper birch may colonize and reproduce and eventually dominate the overstory. This may shade out larger shrubs, allowing competitive forbs, graminoids, and smaller shrubs to colonize. The period needed for this transition currently is unknown. Various factors may influence the transition, including the rate of decrease in soil moisture and the rates of colonization and growth of trees.

Pathway 1.2b
Community 1.2 to 1.3

Tealeaf willow-Sitka alder/bluejoint grass/water horsetail-woodland horsetail scrubland

Common ladyfern-common cowparsnip/red elderberry/moss meadow

Extended period of seepage. Extended periods of saturation by subsurface water and movement of the water may create hypoxic or anoxic conditions that can drown susceptible plants in community 1.2. This would allow more water-tolerant species to colonize. The period needed for this transition is unknown, but it is assumed to be long because many of the plants in the late community phase are facultative or obligate wetland species.

Pathway 1.3a
Community 1.3 to 1.2

Common ladyfern-common cowparsnip/red elderberry/moss meadow

Tealeaf willow-Sitka alder/bluejoint grass/water horsetail-woodland horsetail scrubland

Natural succession: Normal time and growth without disruptive seepage. Over time, a decrease in soil moisture may allow medium and tall shrubs to colonize. The overshadowing caused by these shrubs may lead to a dominance of shade- and moisture-tolerant forbs and graminoids. The period needed for this transition is unknown, but it is hypothesized that hydrophilic shrubs may begin to colonize soon after a major seepage event.

Additional community tables

Inventory data references

Modal points for Community 1.1
11SS00905

Modal points for community 1.2
11SS02401
11SS02601

Modal points for community 1.3

References

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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	05/19/2024
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:

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:**

17. **Perennial plant reproductive capability:**