

Ecological site F236XY152AK

Boreal Forest Volcanic Loamy Swales

Last updated: 2/13/2024
Accessed: 09/25/2026

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

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 boreal ecological site is on swales on forested plains. Site elevation ranges from 30 to 600 feet above sea level. Slopes are nearly level to gentle (0 - 6 percent). Soil hydrology and tree propagule pressure shape the vegetation on this landform. Closed swales are collection sites for precipitation and snow melt. Soils are somewhat poorly drained and wet soil conditions restrict vegetation during the important early growing season. The reference state supports two communities. The reference plant community is characterized as a mixed forest (Viereck et al., 1992). It is composed of a white spruce and birch in the overstory with an understory of low shrubs, ferns and bluejoint. Areas of increased wetness typically cannot support trees. These areas are most commonly found in the center of swales. Both communities can coexist in a single swale and are relatively stable unless shifts to water inputs or ponding depth change.

Associated sites

F236XY115AK	Boreal Forest Loamy Moist Slopes F236XY115AK describes the forested plains and hill backslopes. The swales described by this site (F236XY152AK) are features on the forested plain.
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Similar sites

R236XY151AK	Subarctic Open Willow Loamy Plain Swales R236XY151AK describes swales in the maritime climate zone of MLRA 236. While underlying hydrological processes are the same in both sites, R236XY151AK is noted for the lack of trees.
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Table 1. Dominant plant species

Tree	(1) <i>Picea glauca</i> (2) <i>Betula papyrifera</i>
Shrub	(1) <i>Rubus pedatus</i> (2) <i>Spiraea stevenii</i>
Herbaceous	(1) <i>Dryopteris expansa</i> (2) <i>Calamagrostis canadensis</i>

Physiographic features

This site is in swales on plains. Elevation ranges from 30 to 600 feet above sea level. Slope gradients are nearly level to gentle (0 – 6 percent). Run off is negligible to low and a seasonal water table is present. Ponding is occasional and very brief in the reference plant community. Ponding may be longer and more frequent in the lowest areas described by community 1.2. This site is found at all aspects.

Table 2. Representative physiographic features

Landforms	(1) Plains > Swale
Runoff class	Negligible to low
Flooding frequency	None
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	Occasional
Elevation	10 – 180 m
Slope	0 – 10 %
Water table depth	0 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to low
Flooding frequency	None
Ponding duration	Very brief (4 to 48 hours)

Ponding frequency	Occasional
Elevation	10 – 180 m
Slope	0 – 10 %
Water table depth	0 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 northern 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)	80-100 days
Freeze-free period (characteristic range)	70-90 days
Precipitation total (characteristic range)	530-860 mm
Frost-free period (actual range)	80-100 days
Freeze-free period (actual range)	70-90 days
Precipitation total (actual range)	380-1,040 mm
Frost-free period (average)	90 days
Freeze-free period (average)	80 days
Precipitation total (average)	740 mm

Influencing water features

Due to its landscape position, this site is not influenced by wetland or riparian water features. Precipitation and snow melt are the main sources of water.

Soil features

Soils are relatively young Andisols of volcanic origin (Soil Survey Staff, 2013). Soils are very deep and somewhat poorly drained. They support a cryic temperature regime and an udic moisture regime. Parent material is comprised of organic material over volcanic ash atop slope alluvium.

Soil hydrology is the major soil factor affecting vegetation. Closed swales are collection sites for precipitation and snow melt. Soil is somewhat poorly drained. A water table is present at the soil surface from December through May. Wet soil restricts the vegetation that can grow here during the important early growing season. Other soil characteristics of note include extreme to strong acidity (4.2 – 4.7 pH) in the top 10 inches and the presence of volcanic ash in the soil profile. It's currently unknown what effects these factors have on the vegetation of this site.

Correlated soil components in MLRA 236: Terlak

Table 5. Representative soil features

Parent material	(1) Alluvium (2) Volcanic ash
Surface texture	(1) Highly organic silt loam
Drainage class	Somewhat poorly drained
Permeability class	Moderate
Soil depth	150 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-25.4cm)	6.35 – 7.37 cm
Soil reaction (1:1 water) (0-25.4cm)	4.2 – 4.7
Subsurface fragment volume <=3" (Depth not specified)	0 – 40 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Table 6. Representative soil features (actual values)

Drainage class	Somewhat poorly drained
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Permeability class	Moderate
Soil depth	150 cm
Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %
Available water capacity (0-25.4cm)	6.35 – 7.37 cm
Soil reaction (1:1 water) (0-25.4cm)	4.2 – 4.7
Subsurface fragment volume <=3" (Depth not specified)	0 – 40 %
Subsurface fragment volume >3" (Depth not specified)	0 %

Ecological dynamics

This site is in boreal swales on plains. Local factors such as site hydrology and propagule pressure create two co-occurring vegetative communities. The reference plant community is a mixed birch and white spruce forest.

A vegetative pattern is evident in these swales. Trees are most common along swale edges. Tree presence is a direct effect of the relatively small size of the swales and swale proximity to surrounding forests. Edge effects and tree propagule pressure allow a forest community to grow on a landform and soil that is not commonly associated with trees. Low spots in the swale center are typically too wet for trees and host a dense willow community.

Willows and regenerating trees are browsed by moose. This does not appear to affect the ecological processes or vegetative composition of the site.

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

Figure 7. State-and-transition model.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Inventory data references

Modal points for Community 1.1 08LL10406 11SS01201 11SS02503 11SS02905 Modal points for community 1.2 11SS00705

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)	
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Contact for lead author	
Date	09/25/2026
Approved by	
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:
