

Ecological site F237XY239AK

Boreal Forest Loamy Slopes

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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.

MLRA notes

Major Land Resource Area (MLRA): 237X–Ahklun Mountains

The Ahklun Mountains Major Land Resource Area (MLRA 237) is in western Alaska (fig. 3). This MLRA covers approximately 14,555 square miles, and it includes the mountains, hills, and valleys of the Kilbuck Mountains in the north and the Ahklun Mountains in the south. Except for the Kilbuck Mountains and the highest ridges of the Ahklun Mountains, the MLRA was extensively glaciated during the Pleistocene (Kautz et al., 2004). Today, a few small glaciers persist in mountainous cirques (Gallant et al., 1995). The present-day landscape and landforms reflect this glacial history; glacial moraines and glacial drift cover much of the area (USDA-NRCS, 2006). The landscape of the MLRA is primarily defined by low, steep, rugged mountains cut by narrow-to-broad valleys. Flood plains and terraces of varying sizes are common at the lower elevations in the valley bottoms. Glacially carved valleys host many lakes. Togiak Lake is one of the largest lakes in the region. It is 13 miles long and about 9,500 acres in size. Major rivers include the Goodnews, Togiak, Kanektok, Osviak, Eek, and Arolik Rivers. Where the Goodnews and Togiak Rivers reach the coast, the nearly level to rolling deltas support numerous small lakes.

This MLRA has two distinct climatic zones: subarctic continental and maritime continental (fig. 4). The high-elevation areas are in the subarctic continental zone. The mean annual precipitation is more than 75 inches, and the mean annual air temperature is below about 27 degrees F (-3 degrees C) in extreme locations. The warmer, drier areas at the lower elevations are in the maritime continental zone. The mean annual precipitation is 20 to 50 inches, and the mean annual air temperature is about 30 to 32 degrees F (-0.2 to 1.2 degrees C) (PRISM). This climatic zone is influenced by both maritime and continental factors. The temperatures in summer are moderated by the open waters of the Bering Sea, and the temperatures in winter are more continental due to the presence of ice in the sea (Western Regional Climate Center, 2017). The seasonal ice reaches its southernmost extent off the coast of Alaska in Bristol Bay (Alaska Climate Research Center, 2017). The western coast of Alaska is also influenced by high winds from strong storms and airmasses in the Interior Region of Alaska (Hartmann, 2002).

The Ahklun Mountains MLRA is principally undeveloped wilderness. Federally managed lands include the Togiak and Alaska Maritime National Wildlife Refuges. The MLRA is sparsely populated, but it has several communities, including Togiak, Manokotak, Twin Hills, and Goodnews Bay. Togiak is the largest village. It has a population of approximately 855, most of which are Yup'ik Alaska Natives (U.S. Census Bureau, 2016). Major land uses include subsistence activities (fishing, hunting, and gathering) and wildlife recreation (USDA-NRCS, 2006; Kautz et al., 2004).

Ecological site concept

Ecological site F237XY239AK is on mountainous alluvial fans and surrounding slopes. Climate, landform, soil characteristics, and location are the major factors that result in this ecological site. This site has been documented only in the subarctic continental climate zone (fig. 4). The climate and cold soils in this area are suited to balsam poplar. The reference state supports one documented community phase.

This reference community is an open broadleaf balsam poplar (*Populus balsamifera*) forest (Viereck et al., 1992).

The understory is primarily graminoids and some shrubs and forbs. Common understory plants include bluejoint (*Calamagrostis canadensis*), squashberry (*Viburnum edule*), Barclay's willow (*Salix barclayi*), fireweed (*Chamerion angustifolium*), and field horsetail (*Equisetum arvense*).

Associated sites

R237XY201AK	Western Alaska Maritime Scrubland Gravelly Slopes Site R237XY239AK is on low-elevation discharge slopes and alluvial fans in the subarctic continental climate zone. Other ecological sites that may be adjacent to this site include R237XY201AK, R237XY202AK, R237XY203AK, R237XY204AK, R237XY205AK, R237XY208AK, R237XY210AK, R237XY217AK, and F237XY221AK. These sites are differentiated by landform, soils, disturbance regime, and vegetative communities. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.
R237XY202AK	Western Alaska Maritime Mosaic Gravelly Slopes
R237XY203AK	Western Alaska Maritime Scrubland Gravelly Drainage, Escarpment
R237XY204AK	Western Alaska Maritime Scrubland Loamy Slopes
R237XY205AK	Western Alaska Maritime Scrubland Loamy Swales
R237XY208AK	Western Alaska Maritime Scrubland Peat Depressions
R237XY210AK	Western Alaska Maritime Scrubland Gravelly Flood Plains
R237XY217AK	Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, High Elevation
F237XY221AK	Boreal Woodland Loamy Slopes

Similar sites

F237XY216AK	Boreal Woodland Loamy Flood Plains Site F237XY216AK supports a reference plant community of balsam poplar open forest that is similar to that of site R237XY239AK. Site F237XY216AK is associated with mid to high flood plains, which are markedly different from the alluvial fans of site R237XY239AK. Site F237XY216AK is subject to regular flooding, and the understory composition is distinctly different from that of site R237XY239AK. Separate ecological sites were required because of the differences in disturbance regimes, landform, and soils.
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Figure 1. In some areas, shrubs are nearly absent in the understory and bluejoint is common.



Figure 2. Areas of this ecological site (red circles) are on or proximal to alluvial fans.

Table 1. Dominant plant species

Tree	(1) <i>Populus balsamifera</i>
Shrub	(1) <i>Viburnum edule</i> (2) <i>Salix barclayi</i>
Herbaceous	(1) <i>Calamagrostis canadensis</i>

Physiographic features

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 a unique plant community composition, structure, and function. 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).

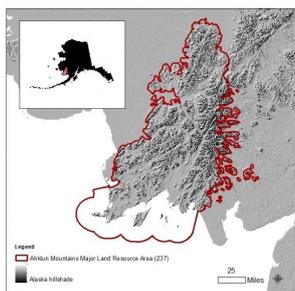


Figure 3. The Ahklun Mountains area (MLRA 237) is in western Alaska.

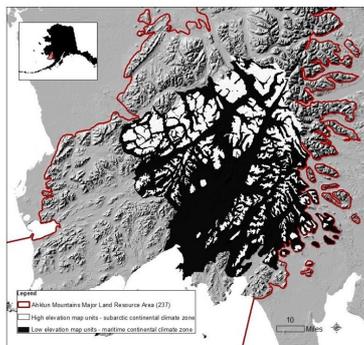


Figure 4. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 2. Representative physiographic features

Slope shape up-down	(1) Convex (2) Linear
Geomorphic position, mountains	(1) Mountainbase (2) Lower third of mountainflank
Slope shape across	(1) Linear
Landforms	(1) Mountains > Alluvial fan (2) Mountains > Mountain slope
Flooding frequency	Rare
Ponding frequency	None
Elevation	160–2,150 ft
Slope	3–15%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Climate of land resource region (LLR): 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 continental in the lowlands and subarctic continental at higher elevations. The mean annual precipitation is 20 to 30 inches in the lowlands, and it increases to more than 45 inches at the higher elevations. The mean annual air temperature along the coast is about 34 degrees F (1 degree C) (PRISM). Strong winds are common throughout the year.

Table 3. Representative climatic features

Frost-free period (characteristic range)	70-135 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

Influencing water features

Soil features

This ecological site is correlated to the Waskey soil. This soil is well drained and very deep to a root-restrictive layer. The saturated hydraulic conductivity of the soil is moderately high throughout. These characteristics may

mitigate the effects of the rare periods of flooding on the site. The upper part of the soil is very strongly acid, and the lower part is strongly acid or moderately acid throughout.

Table 4. Representative soil features

Drainage class	Well drained
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Ecological dynamics

Site F237XY239AK is on and proximal to alluvial fans and dominantly in the subarctic continental climate zone (fig. 2). These areas have the ideal climate, landform, and soils to support poplar populations. The northern half of MLRA 237 has many glacially-carved valleys that run east to west. These valleys create the winding, interlocking border between MLRA 237 and abutting MLRA 236 (Bristol Bay—Northern Alaska Peninsula Lowlands) to the east (figs. 3 and 4). It is hypothesized that these valley corridors allowed for the spread of poplar seeds from MLRA 236 to MLRA 237.

The well drained soils and boreal climate of the alluvial fans are ideal for balsam poplar. The alluvial fans in the western part of the MLRA typically support the same ecological site as surrounding mountain slopes, although more feltleaf willow (*Salix alaxensis*) may be on the alluvial fans (personal observation). Currently, it is unknown if the alluvial fans on the far western side of the Ahklun Mountains area have the conditions necessary to support this ecological site. If the ideal conditions are elsewhere, increased propagule pressure generated by this ecological site likely will be a major factor in the spread of balsam poplar to new areas.

Disturbance Dynamics

No known disturbance regime associated with this ecological results in an early community phase.

Flooding

The alluvial fans are subject to rare periods of flooding (1 to 5 times in 100 years). No evidence indicates that this disturbance creates an early community phase. It is possible that the site undergoes erosion linked to hydrology, but field data did not include any recently disturbed areas. It is also possible that flooding or subsequent erosion does not surpass the resilience threshold required to change the vegetative community. The soil is well drained, which mitigates excess water in the soil. Because the root-restrictive layer is at a depth of more than 60 inches, the roots of trees and shrubs can extend deep into the soil. Thus, the vegetation is resilient to scouring.

Windthrow

Windthrow likely occurs in these open forests. This localized disturbance may help to prevent the reference plant community from becoming a closed forest.

Fire

No incidence or evidence of fire was recorded in situ for this ecological site, but previous wildfires have been mapped in areas of the site. Historically, the two main causes of wildfires in the Ahklun Mountains area are lightning strikes and human activity (AICC, 2017).

Other Observations

Slight browsing on shrubs by unknown species was noted. This browsing does not appear to alter the vegetative community.

Currently, no alternative states are associated with this ecological site.

State and transition model

1. Reference State

Community Phase 1.1
Balsam poplar/squashberry-Barclay's willow/bluejoint
Alaska vegetation classification:
Open broadleaf forest

Figure 5. State-and-transition model.

State 1
Reference State

The reference state supports one community phase that is distinguished by the developed structure and dominance of the vegetation and the ecological function and stability of the community (fig. 5). The reference community has a canopy of deciduous trees and an understory of shrubs, forbs, and graminoids. Windthrow may be an important factor in maintaining the open forest. This report provides baseline vegetation inventory data. Future data collection is needed to provide further information about the existing plant community and the potential for disturbances to create early community phases. Common and scientific names are from the USDA PLANTS database. All community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1
Balsam poplar/squashberry-Barclay's willow/bluejoint (Populus balsamifera/Viburnum edule-Salix barclayi/Calamagrostis canadensis)

Figure 6. Area of the reference plant community that has spaced balsam poplar trees and a dense understory.

Community Phase 1.1 Canopy Cover Table

Vegetation data are aggregated across modal sample plots for this community phase and are provided as a frequency (percent) and mean canopy cover (percent) of the dominant and most 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	Balsam poplar	<i>Populus balsamifera</i>	PCBA2	100	40 (29-70)
S	Squashberry	<i>Viburnum edule</i>	VIED	60	10 (0-30)
S	Barclay's willow	<i>Salix barclayi</i>	SABA3	60	4 (0-10)
G	Bluejoint	<i>Calamagrostis canadensis</i>	CACA4	100	60 (40-75)
F	Fireweed	<i>Chamerion angustifolium</i>	CHAN9	100	5 (1-20)
F	Field horsetail	<i>Equisetum arvense</i>	EQAR	100	2 (1-5)
F	Canadian burnet	<i>Sanguisorba canadensis</i>	SACA14	100	2 (1-2)
F	Woolly geranium	<i>Geranium erianthum</i>	GEER2	100	2 (0.1-3)
F	Common cowparsnip	<i>Heracleum maximum</i>	HEMA80	60	4 (0-10)

This dataset includes data from 35 sample plots. The sample plots are distributed across the Athlun Mountains 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 are based on ocular estimates and rounded, except trace (0.1 percent) cover. Data ranging from 1 to 9 percent cover are rounded to the nearest integer. Data ranging from 10 to 100 percent cover are rounded to the nearest factor of 5.
Values for tall, medium, and stunted tree strata are used to calculate mean canopy cover and range. Regenerative trees are not included in the calculations.

Figure 7. Canopy cover and frequency of species in community phase 1.1.

The reference plant community is characterized as an open broadleaf forest (fig. 6) (Viereck et al., 1992). The understory consists of graminoids, myriad forbs, and some shrubs. The main vegetative strata are tall graminoids (more than 2 feet in height), tall trees (more than 40 feet), medium shrubs (3 to 10 feet), and tall forbs (more than 2 feet) (fig. 7). The canopy consists of balsam poplar exclusively. Understory plants commonly include a mix of shrubs such as squashberry and Barclay's willow, but few if any shrubs are in some areas (fig. 1). Other understory species include bluejoint and various forbs such as fireweed, field horsetail (*Equisetum arvense*), Canadian burnet (*Sanguisorba canadensis*), common cowparsnip (*Heracleum maximum*), and woolly geranium (*Geranium erianthum*). The ground cover is dominantly herbaceous and woody litter and some ground moss. Some areas are bare soil.

Additional community tables

Other references

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Approval

Michael Margo, 7/23/2020

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	04/26/2024
Approved by	Michael Margo
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:**
