

## Ecological site F237XY221AK Boreal Woodland Loamy Slopes

Last updated: 7/23/2020  
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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. 2). 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. 3). 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 F237XY221AK is on mountain backslopes and footslopes and alluvial fans at the northern end of Togiak Lake. The site is in the eastern part of the Ahklun Mountains area, and it is susceptible to tree propagule pressure from neighboring MLRA 236 (Bristol Bay–Northern Alaska Peninsula Lowlands). The reference state supports one documented community phase.

The reference plant community is broadleaf woodland (Viereck et al., 1992) that consists of Kenai birch (*Betula*

*papyrifera* var. *kenaica*) and a mixed understory of shrubs, graminoids, and forbs. The understory commonly includes dense ferns, bluejoint (*Calamagrostis canadensis*), and beaverd spirea (*Spiraea stevenii*).

### Associated sites

R237XY210AK	<p><b>Western Alaska Maritime Scrubland Gravelly Flood Plains</b></p> <p>Site F237XY221AK is on alluvial fans and lower backslopes and footslopes of mountains at the northern end of Togiak Lake. Other ecological sites that may be adjacent to or near site F237XY221AK include sites R237AK204AK, R237AK210AK, and F237AK239AK. Site F237XY221AK is differentiated from these other sites by landform, soils, disturbance regime, and vegetative communities. Ecotonal plant communities that have characteristics of each individual ecological site are in areas where these sites abut.</p>
F237XY239AK	<p><b>Boreal Forest Loamy Slopes</b></p> <p>Site F237XY221AK is on alluvial fans and lower backslopes and footslopes of mountains at the northern end of Togiak Lake. Other ecological sites that may be adjacent to or near site F237XY221AK include sites R237AK204AK, R237AK210AK, and F237AK239AK. Site F237XY221AK is differentiated from these other sites by landform, soils, disturbance regime, and vegetative communities. Ecotonal plant communities that have characteristics of each individual ecological site are in areas where these sites abut.</p>
R237XY204AK	<p><b>Western Alaska Maritime Scrubland Loamy Slopes</b></p> <p>Site F237XY221AK is on alluvial fans and lower backslopes and footslopes of mountains at the northern end of Togiak Lake. Other ecological sites that may be adjacent to or near site F237XY221AK include sites R237AK204AK, R237AK210AK, and F237AK239AK. Site F237XY221AK is differentiated from these other sites by landform, soils, disturbance regime, and vegetative communities. Ecotonal plant communities that have characteristics of each individual ecological site are in areas where these sites abut.</p>

### Similar sites

F237XY239AK	<p><b>Boreal Forest Loamy Slopes</b></p> <p>Site F237XY221AK is the only birch forest in the Ahklun Mountains area. Ecological site F237XY239AK supports a forested reference plant community, but the major tree species is balsam poplar (<i>Populus balsamifera</i>).</p>
F237XY216AK	<p><b>Boreal Woodland Loamy Flood Plains</b></p> <p>Site F237XY221AK is the only birch forest in the Ahklun Mountains area. Ecological sites F237XY216AK supports a forested reference plant community, but the major tree species is balsam poplar (<i>Populus balsamifera</i>).</p>



Figure 1. Understory communities in areas of Northspit soils (shown here) appear to be more productive than those in areas of Sundaycreek soils (fig. 5).

Table 1. Dominant plant species

Tree	(1) <i>Betula papyrifera</i> var. <i>kenaica</i>
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Shrub	(1) <i>Spiraea stevenii</i> (2) <i>Alnus viridis ssp. sinuata</i>
Herbaceous	(1) <i>Gymnocarpium dryopteris</i> (2) <i>Dryopteris expansa</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).

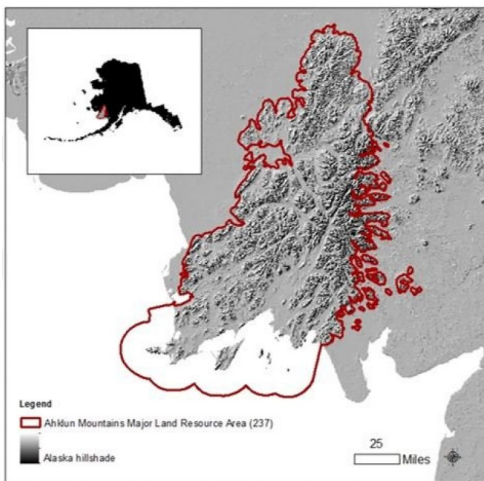


Figure 2. The Ahklun Mountains area (MLRA 237) is in western Alaska.

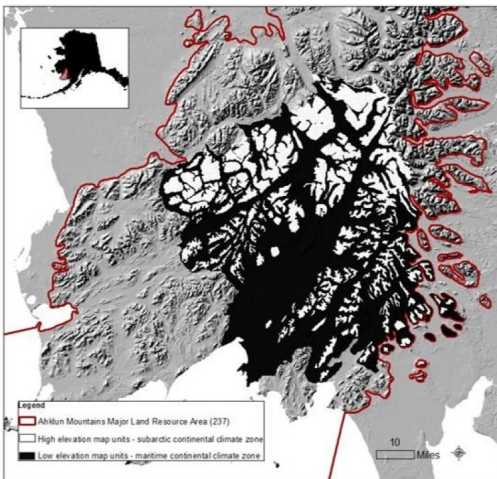


Figure 3. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 2. Representative physiographic features

Slope shape across	(1) Convex (2) Linear
Slope shape up-down	(1) Linear
Geomorphic position, mountains	(1) Mountainbase (2) Lower third of mountainflank
Landforms	(1) Mountains > Mountain slope (2) Mountains > Alluvial fan

Flooding frequency	None
Ponding frequency	None
Elevation	66–370 m
Slope	5–40%
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)	75-130 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

## Influencing water features

### Soil features

The Northspit and Sundaycreek soils are correlated to this ecological site. The Northspit soils are well drained, and the Sundaycreek soils are somewhat excessively drained. Both soils are shallow (10 to 20 inches) to a root-restricting layer. The solum generally is extremely acid (pH 3.5 to 4.4), and the upper organic layer may have pH as low as 3.8. The somewhat excessively drained Sundaycreek soils appear to support a less productive understory than do the well drained Northspit soils (personal observation, fig. 1).

**Table 4. Representative soil features**

Drainage class	Well drained to somewhat excessively drained
Depth to restrictive layer	25–51 cm

## Ecological dynamics

### Overview

Site F237XY221AK is on alluvial fans and lower backslopes and footslopes of mountains bordering the northern half of Togiak Lake. This area supports the ideal soils (acidic, well drained or somewhat excessively drained, and cold) and climate for populations of birch trees (Moore, 2002). Togiak Lake is near the eastern edge of MLRA 237, where it abuts MLRA 236 (Bristol Bay-Northern Alaska Peninsula Lowlands). The MLRA border was carved by glaciers during the Pleistocene, creating mountain valleys along an east/west trajectory (fig. 3). MLRA 236 supports various forested ecological sites (Soil Survey Staff, 2017). It is believed that these valley corridors allowed for the western movement of birch trees via windblown seeds. The only documented area of site F237XY221AK is on the lower mountain slopes and alluvial fans bordering the northern half of Togiak Lake.

### Disturbance Dynamics

Disturbances resulting in transitions of community phases or states were not observed. This ecological site may undergo one or more disturbances, but the limited data collected for the relatively small site did not include data

from areas that had undergone a recent disturbance.

## Windthrow

Windthrow likely occurs on these slopes because the soils are shallow to a root-restricting layer. Windthrow does not result in a documented early sere. It may contribute to the resilience of the reference plant community by maintaining an open forest. Birch is shade intolerant (Moore, 2002); therefore, a closed birch forest would likely succumb to dieback.

## Other Observations

Browsing by moose on trees and shrubs was not documented, but it probably occurs in this ecological site. Browsing is not likely to affect the ecological processes significantly enough to alter the communities.

No alternate states currently are associated with this ecological site.

## State and transition model

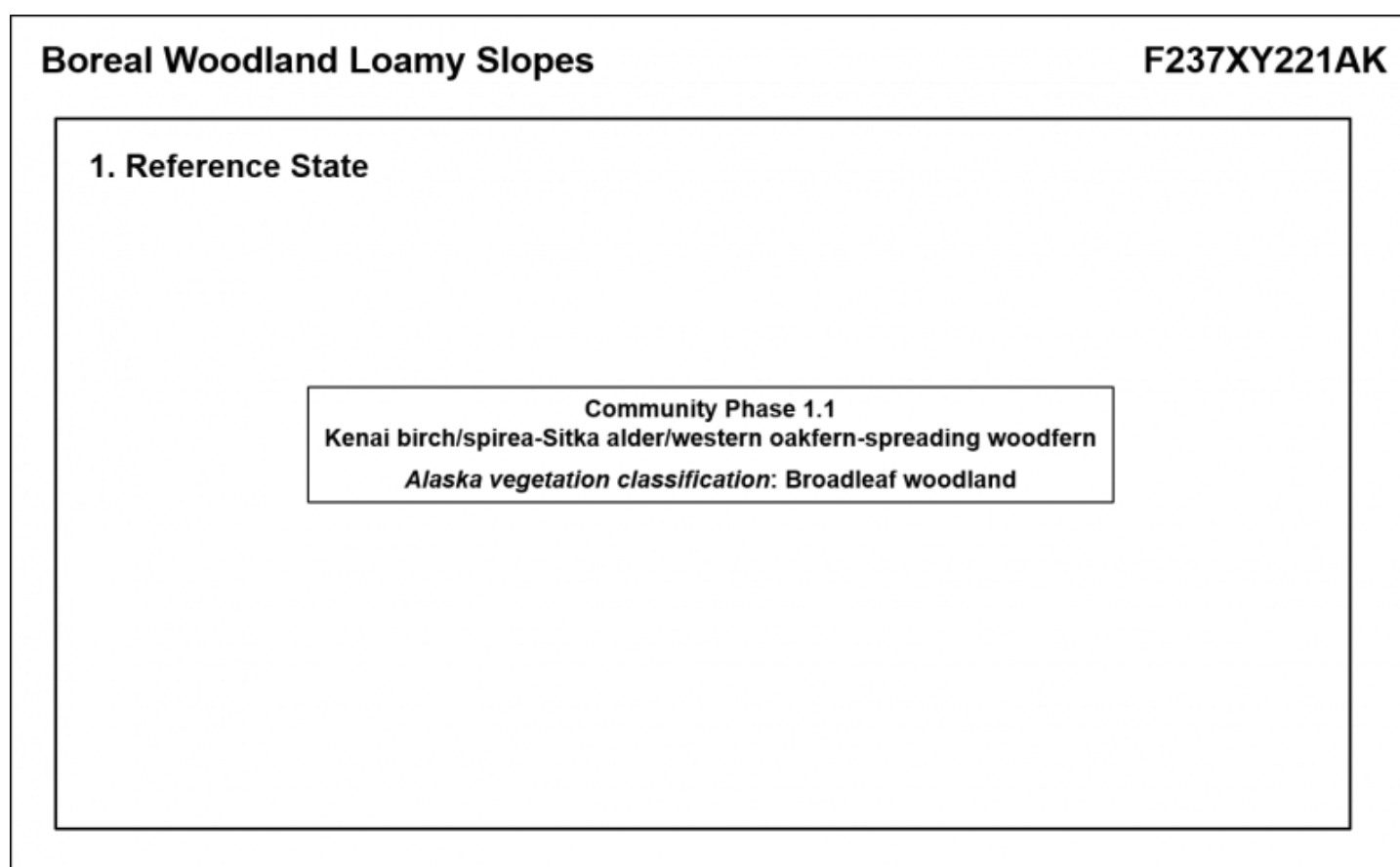


Figure 4. State-and-transition model.

## State 1

### Reference State

The reference state supports a single community phase that is distinguished by the developed structure and dominance of the vegetation and the ecological function and stability of the community (fig. 4). The reference community phase is a broadleaf woodland consisting primarily of birch trees and an understory of shrubs, forbs, and graminoids. 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. Community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

### Community 1.1



## Kenai birch/spirea-Sitka alder/western oakfern-spreading woodfern (*Betula papyrifera* var. *kenaica*/Spiraea stevenii-Alnus viridis ssp. *sinuata*/Gymnocarpium dryopteris-Dryopteris expansa)



Figure 5. Typical area of plant community 1.1. Datum point associated with the Sundaycreek soil.

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	Kenai birch	<i>Betula papyrifera</i> var. <i>kenaica</i>	BEPAK	100	15 (15-20)
S	Beauverd spirea	<i>Spiraea stevenii</i>	SPST3	100	7 (0.1-20)
S	Sitka alder	<i>Alnus viridis</i> ssp. <i>sinuata</i>	ALVIS	100	3 (1-4)
S	Greene's mountain ash	<i>Sorbus scopulina</i>	SOSC2	67	2 (0-5)
G	Bluejoint	<i>Calamagrostis canadensis</i>	CACA4	100	9 (3-20)
F	Western oakfern	<i>Gymnocarpium dryopteris</i>	GYDR	100	30 (2-80)
F	Spreading woodfern	<i>Dryopteris expansa</i>	DREX2	100	30 (5-80)
B	Schreber's big red stem moss	<i>Pleurozium schreberi</i>	PLSC70	100	1 (0.1-3)
B	Splendid feather moss	<i>Hypnum splendens</i>	HYSP70	67	2 (0-5)

This dataset includes data from three sample plots. The sample plots are distributed across the Ahklun 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 6. Canopy cover and frequency of species in community 1.1.

The reference plant community is characterized as broadleaf woodland (Vioreck et al., 1992) (fig. 5). The understory consists of a myriad of shrubs and forbs and sporadic graminoids. Medium forbs (4 to 24 inches in height), medium trees (15 to 40 feet), and medium shrubs (3 to 10 feet) are the major vegetative strata (fig. 6). Kenai birch is dominant in the canopy. Understory plants typically include ferns such as western oakfern (*Gymnocarpium dryopteris*) and spreading woodfern (*Dryopteris expansa*), shrubs such as Sitka alder (*Alnus viridis* ssp. *sinuata*), beauverd spirea, and Greene's mountain ash (*Sorbus scopulina*), and graminoids such as bluejoint. Other species may include bog blueberry (*Vaccinium uliginosum*), arctic starflower (*Trientalis europaea*), strawberryleaf raspberry (*Rubus pedatus*), and stiff clubmoss (*Lycopodium annotinum*). The ground cover is dominantly herbaceous litter, but ground moss and woody litter are common.

## Additional community tables

### Other references

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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.

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## Contributors

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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	04/29/2024
Approved by	Michael Margo
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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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):**
- 

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:**
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17. **Perennial plant reproductive capability:**
-