Ecological site R237XY204AK
Western Alaska Maritime Scrubland Loamy Slopes

Last updated: 7/23/2020
Accessed: 04/22/2026

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): 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

This ecological site is on mountain slopes, hillslopes, and glaciated plains throughout the Ahklun Mountains area. The slopes are linear to convex. The soils are well drained. The vegetation in community 1.1 stabilizes the soils, resulting in negligible downslope erosion. The reference state supports one documented community phase. The reference plant community is a shrub tundra consisting of black crowberry (Empetrum nigrum), dwarf birch (Betula nana), marsh Labrador tea (Ledum palustre ssp. decumbens), lingonberry (Vaccinium vitis-idaea), and bog blueberry (Vaccinium uliginosum). Various lichens and mosses make up much of the ground cover.

Associated sites

R237XY202AK	**Western Alaska Maritime Mosaic Gravelly Slopes** Site R237XY204AK is on convex to linear slopes of mountains and hills and linear slopes of rolling, glaciated plains throughout the Ahklun Mountains area. Ecological sites R237XY202AK, R237XY210AK, R237XY211AK, R237XY212AK, R237XY222AK, R237XY230AK, and R237XY218AK are adjacent to or in close proximity to site R237XY204AK. These sites are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants.

R237XY210AK	**Western Alaska Maritime Scrubland Gravelly Flood Plains** Site R237XY204AK is on convex to linear slopes of mountains and hills and linear slopes of rolling, glaciated plains throughout the Ahklun Mountains area. Ecological sites R237XY202AK, R237XY210AK, R237XY211AK, R237XY212AK, R237XY222AK, R237XY230AK, and R237XY218AK are adjacent to or in close proximity to site R237XY204AK. These sites are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants.
R237XY211AK	**Western Alaska Maritime Scrubland Loamy Flood Plains** Site R237XY204AK is on convex to linear slopes of mountains and hills and linear slopes of rolling, glaciated plains throughout the Ahklun Mountains area. Ecological sites R237XY202AK, R237XY210AK, R237XY211AK, R237XY212AK, R237XY222AK, R237XY230AK, and R237XY218AK are adjacent to or in close proximity to site R237XY204AK. These sites are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants.
R237XY212AK	**Western Alaska Maritime Scrubland Silty Flood Plains** Site R237XY204AK is on convex to linear slopes of mountains and hills and linear slopes of rolling, glaciated plains throughout the Ahklun Mountains area. Ecological sites R237XY202AK, R237XY210AK, R237XY211AK, R237XY212AK, R237XY222AK, R237XY230AK, and R237XY218AK are adjacent to or in close proximity to site R237XY204AK. These sites are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants.
R237XY222AK	**Western Alaska Maritime Scrubland Loamy Hummocks** Site R237XY204AK is on convex to linear slopes of mountains and hills and linear slopes of rolling, glaciated plains throughout the Ahklun Mountains area. Ecological sites R237XY202AK, R237XY210AK, R237XY211AK, R237XY212AK, R237XY222AK, R237XY230AK, and R237XY218AK are adjacent to or in close proximity to site R237XY204AK. These sites are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants.
R237XY230AK	**Western Alaska Maritime Scrubland Silty Plains and Mountain Slopes, Lower** Site R237XY204AK is on convex to linear slopes of mountains and hills and linear slopes of rolling, glaciated plains throughout the Ahklun Mountains area. Ecological sites R237XY202AK, R237XY210AK, R237XY211AK, R237XY212AK, R237XY222AK, R237XY230AK, and R237XY218AK are adjacent to or in close proximity to site R237XY204AK. These sites are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants.
R237XY218AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, Concave** Site R237XY204AK is on convex to linear slopes of mountains and hills and linear slopes of rolling, glaciated plains throughout the Ahklun Mountains area. Ecological sites R237XY202AK, R237XY210AK, R237XY211AK, R237XY212AK, R237XY222AK, R237XY230AK, and R237XY218AK are adjacent to or in close proximity to site R237XY204AK. These sites are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants.

Similar sites

R237XY201AK	**Western Alaska Maritime Scrubland Gravelly Slopes** Site R237XY201AK supports some of the same low and dwarf shrub species as those supported by site R237XY204AK, but the overall reference plant communities differ. The total cover of shrubs and moss in site R237XY201AK is lower and the total cover of lichen is much higher and more diverse than in the reference plant community of site R237XY204AK. Site R237XY201AK is susceptible to caribou cratering and wind erosion, and site R237XY204AK is not.
R237XY215AK	**Western Alaska Maritime Scrubland Loamy Plains** Although many of the same species are in the reference plant community of sites R237XY215AK and R237XY204AK, shrubs appear to be much less productive in site R237XY215AK (personal observation). Climatic factors and exposure likely cause this difference in production.
R237XY218AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, Concave** Site R237XY218AK supports a reference plant community similar to that of site R237XY204AK. Site R237XY218AK is at higher elevations, and alpine plants such as Alaska bellheather (Harrimanella stelleriana) and Aleutian mountainheath (Phyllodoce aleutica) are interspersed throughout the scrubland in this site. Site R237XY204AK does not support alpine plants.

Figure 1. Site R237XY204AK is on linear to convex slopes of mountains and glaciated plains.

Figure 2. The Buchia soil is on mountain backslopes. Plant productivity may decrease as elevation increases.

Table 3. Dominant plant species

Tree	Not specified
Shrub	(1) *Empetrum nigrum* (2) *Betula nana*
Herbaceous	(1) *Cladina*

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

Figure 2. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 4. Representative physiographic features

Geomorphic position, mountains	(1) Mountainflank (2) Mountainbase
Slope shape across	(1) Convex (2) Linear
Slope shape up-down	(1) Convex (2) Linear
Geomorphic position, flats	(1) Rise
Landforms	(1) Mountains > Mountainside (2) Hills > Hillside or mountainside (3) Plains > Rise
Flooding frequency	None
Ponding frequency	None
Elevation	10 – 980 m
Slope	0 – 90 %
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, 2014). Strong winds are common throughout the year.

Table 5 Representative climatic features

Frost-free period (characteristic range)	70-140 days
Freeze-free period (characteristic range)	

Precipitation total (characteristic range)	

Influencing water features

Soil features

The Buchia, Nagugun, and Nigag soils are correlated to this ecological site. These soils are well drained. The saturated hydraulic conductivity dominantly is moderately high, but it is high in the gravelly substratum of the Nagugun and Nigag soils.. The upper part of the soils is extremely acid or very strongly acid, but the lower part decreases in acidity from strongly acid to slightly acid as depth increases.

Table 6. Representative soil features

Drainage class	Well drained

Ecological dynamics

Site R237XY204AK is on mountains, hills, and rolling, glaciated plains throughout the Ahklun Mountains area (figs. 1 and 2). Slope shape is an important site characteristic. This site generally is on convex to linear mountain slopes and hillslopes and on linear slopes of rolling, glaciated plains. Site R237XY202AK is on concave to linear mountain slopes, and it supports a unique mosaic of medium and tall shrubs (more than 3 feet in height). Sites R237XY206AK and R237XY217AK are on high-elevation mountain slopes, and they support alpine plant communities.

Site R237XY204AK supports a single, stable plant community. The vegetative mat stabilizes the soils, which limits erosion. The upper part of the soils is extremely acid or very strongly acidic, which is typical in ericaceous plant communities (Viereck et al., 1992). The acidic, well drained soils; dense vegetation; and allelopathic effects associated with the Empetrum genus may prevent colonization of herbaceous plants and larger shrubs in the dwarf scrub community (Bråthen et al., 2010; Swanson, 2015). Natural variation in plant richness and cover may be evident among areas of this ecological site.

Disturbance Dynamics

This ecological site is in stable landscape positions. Disturbances that result in community phase or state transitions were not observed. As a result of anthropogenic disturbances that remove vegetation, the site may be subject to disturbances such as erosion that can alter the reference plant community and produce separate plant community phases. This type of disturbance was not observed in situ.

Fire

No incidence or evidence of fire was recorded in situ for this ecological site; however, previous wildfires have been mapped in areas of the site. Historically, the main causes of wildfires are lightning strikes and human activity (AICC, 2017). Currently, the restoration pathway of the vegetative community post-fire is unknown.

Other Observations

The elevation of site R237XY204AK varies. Areas at higher elevations typically support shorter plants than do those at lower elevations (personal observation). Abiotic characteristics correlated to elevation, such as temperature, precipitation, and length of growing season, likely are responsible for this pattern. Plant production is hypothesized to decrease as elevation increases. Plant communities in this site associated with areas of the Nagugun soils may be the most productive because they are at the lowest elevations. The Buchia soils are at the highest elevations, and the plant production appears to be lowest in areas associated with these soils (fig. 2). Further data is needed to determine differences in productivity among the soils correlated to this site. Two or three unique ecological sites may be needed based on productivity.

Grazing and browsing have been observed in the reference plant community phase, including caribou grazing of lichens and hare browsing of willows and other shrubs. Human activity such as berry picking in plant community 1.1 is not expected to influence the ecological site.

No alternate states were observed for this ecological site.

State and transition model

Figure 3. 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 (%)

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	04/22/2026
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):**

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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):**

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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:**
