Ecological site R237XY201AK
Western Alaska Maritime Scrubland Gravelly 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 R237XY201AK is in convex to linear areas of rolling, glaciated plains throughout the Ahklun Mountains area. The climate, landform, and soil characteristics create a unique ecological site. The associated soils are well drained or somewhat excessively drained. The reference state supports two community phases dictated by wind erosion and historically heavy use by caribou. The reference plant community is characterized as an ericaceous dwarf scrubland (Viereck et al., 1992) that has extensive lichen cover. Common shrubs include black crowberry (Empetrum nigrum), dwarf birch (Betula nana), marsh Labrador tea (Ledum palustre ssp. decumbens), and bog blueberry (Vaccinium uliginosum). Lichens include greygreen reindeer lichen (Cladina rangiferina), star reindeer lichen (C. stellaris), and snow lichens (Stereocaulon spp.).

Associated sites

R237XY204AK	**Western Alaska Maritime Scrubland Loamy Slopes** Ecological site R237XY201AK is in convex to linear areas of rolling, glaciated plains. Site R237XY204AK is in linear areas of the plains. Differences in landform, disturbance regimes, and associated soils create unique and easily distinguishable vegetative communities on these associated ecological sites. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.

R237XY205AK	**Western Alaska Maritime Scrubland Loamy Swales** Ecological site R237XY201AK is in convex to linear areas of rolling, glaciated plains. Site R237XY205AK is in concave areas of the plains. Differences in landform, disturbance regimes, and associated soils create unique and easily distinguishable vegetative communities on these associated ecological sites. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.

Similar sites

R237XY217AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, High Elevation** Site R237XY217AK, which is on high-elevation summits and shoulders of mountains, has several site characteristics similar to those of site R237XY201AK. These include exposure to wind, well drained and somewhat excessively drained soils, and cool soil temperatures in winter. Separate ecological sites are needed because of differences in plant cover, species richness, and disturbance regimes.
R237XY204AK	**Western Alaska Maritime Scrubland Loamy Slopes** Several ecological sites in the Ahklun Mountains area support a reference community characterized as open low scrub. Although the plant communities may be similar, none of the reference plant communities are identical. Differences in landforms, reference state vegetation, soils, and disturbance regimes differentiate the sites.
R237XY205AK	**Western Alaska Maritime Scrubland Loamy Swales** Several ecological sites in the Ahklun Mountains area support a reference community characterized as open low scrub. Although the plant communities may be similar, none of the reference plant communities are identical. Differences in landforms, reference state vegetation, soils, and disturbance regimes differentiate the sites.
R237XY218AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, Concave** Several ecological sites in the Ahklun Mountains area support a reference community characterized as open low scrub. Although the plant communities may be similar, none of the reference plant communities are identical. Differences in landforms, reference state vegetation, soils, and disturbance regimes differentiate the sites.
R237XY219AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, Very Steep** Several ecological sites in the Ahklun Mountains area support a reference community characterized as open low scrub. Although the plant communities may be similar, none of the reference plant communities are identical. Differences in landforms, reference state vegetation, soils, and disturbance regimes differentiate the sites.
R237XY236AK	**Western Alaska Maritime Graminoid Peat Plains** Several ecological sites in the Ahklun Mountains area support a reference community characterized as open low scrub. Although the plant communities may be similar, none of the reference plant communities are identical. Differences in landforms, reference state vegetation, soils, and disturbance regimes differentiate the sites.

Figure 1. Area of reference plant community in foreground and early disturbance phase in mid background.

Figure 2. Reference plant community in a convex area.

Table 3. Dominant plant species

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

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

Slope shape across	(1) Convex
Slope shape up-down	(1) Convex (2) Linear
Geomorphic position, flats	(1) Rise
Landforms	(1) Plains > Plain
Flooding frequency	None
Ponding frequency	None
Elevation	10 – 820 m
Slope	0 – 30 %
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 5 Representative climatic features

Frost-free period (characteristic range)	80-140 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

Influencing water features

Soil features

The Goodnews and Kwethluk soils are correlated to this ecological site. These soils are well drained or somewhat excessively drained, have a thin (0 to 2 inches thick) organic layer, and do not have a water table. The Goodnews soil is shallow to lithic bedrock (10 to 20 inches). The saturated hydraulic conductivity of the Kwethluk soil is moderately high or high in the upper part and very high in the glacial underlying material, and the saturated hydraulic conductivity of the Goodnews soil is high or very high.

Table 6. Representative soil features

Drainage class	Well drained to somewhat excessively drained
Depth to restrictive layer	30 – 50 cm

Ecological dynamics

Ecological site R237XY201AK is in convex to linear areas of rolling, glaciated plains (figs. 1 and 2). Site R237XY204AK is in linear areas of the plains, and site R237XY205AK is in concave areas. Differences in landform, soils, and site characteristics create unique and easily distinguishable vegetative communities in these sites.

The soils associated with site R237XY201AK have colder temperatures in winter and warmer temperatures in summer as compared to other soils at similar elevations. Wind in the exposed, convex positions decreases snowpack and insulation in winter, resulting in colder temperatures and less moisture infiltrating the ground during snowmelt in spring. Good exposure to sunlight and the gravelly substratum in the soils result in quick thawing in spring and warmer soil temperatures in summer.

Exposure to wind, the natural drainage class of the soils, and cool soil temperatures in winter are important factors that control the vegetation of the reference state. The plant communities are dominantly dwarf, hardy shrubs and diverse fruticose lichens. Shrubs that can reproduce in well drained soils are limited by the cold temperatures and exposure to wind (Hobbie and Chapin, 1998). Lichens thrive under these conditions because the dwarf, low-growing shrubs provide protection from wind and the limited soil moisture restricts growth of grasses and forbs.

Disturbance Dynamics

Cratering and Wind Scouring

Wind scouring after cratering by caribou is the major documented disturbance associated with this ecological site. Caribou grazing can lead to cratering, which exposes the mineral soil. Cratering is a result of caribou digging through snow to graze on lichen, which is limited from previous grazing. This disturbance results in an early plant community phase. Grazing can decrease the community biomass (Gilbert, 1974) and relative abundance of lichen (Helle and Aspi, 1983), and cratering can damage and shift individual and clumped lichen

(Cooper et al., 2001). High winds in cratered areas can erode the exposed soils and produce unvegetated blowouts that consist dominantly of surface rock fragments and coarsely textured soils (Lyles and Tatarko, 1986) (See Schoeneberger and Wysocki, 2012, for a description of blowouts.). Revegetation of the exposed glacial underlying material is slow.

This disturbance is localized. It occurs on small rises or in other slightly elevated areas where the wind has limited the snow depth (fig. 1). Somewhat excessively drained and sandy soils are more susceptible to this wind erosion than are loamy or loamy-skeletal soils (U.S. Department of Agriculture, 2018). Thus, it is likely that the Kwethluk soils are more susceptible to this wind erosion than are the Goodnews soils. Further field observations are required to document the full causes and effects of these disturbance dynamics. Natural variations in plant richness and cover may be evident among areas of this ecological site.

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

The lichens in this ecological site provide forage for caribou in winter. Shrubs may be browsed, but the normal level of browsing pressure typically does not decrease the shrub population.

This ecological site typically is far from established villages and towns, which limits direct anthropogenic influences.

No alternative states were observed in 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 (%)

Table 8. Community 1.2 plant community composition

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

Other references

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Contributors

Kendra Moseley
Michael Margo
Stephanie Schmit
Sue Tester
Charlotte Crowder

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):**

   _____

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:

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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:**
