

Ecological site R237XY218AK

Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, Concave

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. 4). 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. 5). 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 R237XY218AK is associated with well drained, acidic soils on high-elevation, concave backslopes of mountains. Landform, slope shape, and climatic factors differentiate this ecological site from other sites. No recorded disturbance results in an early community phase that is distinctly different from the reference plant community. No alternate states are associated with this ecological site.

The reference plant community is an ericaceous dwarf scrubland tundra (Viereck et al., 1992). Dominant species

include black crowberry (*Empetrum nigrum*), lingonberry (*Vaccinium vitis-idaea*), bog blueberry (*Vaccinium uliginosum*), and Alaska bellheather (*Harrimanella stelleriana*). Graminoids and forbs typically are present, and various lichens are common in the ground cover.

Associated sites

R237XY202AK	Western Alaska Maritime Mosaic Gravelly Slopes
R237XY204AK	Western Alaska Maritime Scrubland Loamy Slopes
R237XY205AK	Western Alaska Maritime Scrubland Loamy Swales
R237XY217AK	Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, High Elevation
R237XY206AK	Western Alaska Maritime Dwarf Scrubland Loamy Drainage, High Elevation Ecological site R237XY218AK is on high-elevation, concave backslopes of mountains. Several ecological sites are directly adjacent to or in close proximity of this site. These sites typically are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants. Sites R237XY202AK and R237XY204AK are on linear and convex backslopes and footslopes, respectively; sites R237XY205AK and R237XY206AK are in drainageways and swales of mountains and hills; and site R237XY217AK is on alpine summits and shoulders. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.

Similar sites

R237XY201AK	Western Alaska Maritime Scrubland Gravelly Slopes Site R237XY201AK supports dwarf scrub cover similar to that of site R237XY218AK, but site R237XY201AK has a higher abundance of lichen and undergoes a unique disturbance regime. Differences in landform and other site and soil characteristics lead to distinct disturbance regimes and early community phases. These differences require the use of separate ecological sites.
R237XY204AK	Western Alaska Maritime Scrubland Loamy Slopes Site R237XY204AK is similar to site R237XY218AK, but site R237XY204AK is in exposed areas at lower elevations and does not support alpine plants. Differences in landform and other site and soil characteristics lead to distinct disturbance regimes and early community phases. These differences require the use of separate ecological sites.
R237XY217AK	Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, High Elevation Exposure and the rocky, lithic soils associated with site R237XY217AK create growing conditions that support a different variety of shrubs and forbs and less lichen than that of site R237XY218AK. Differences in landform and other site and soil characteristics lead to distinct disturbance regimes and early community phases. These differences require the use of separate ecological sites.



Figure 1. This ecological site is correlated to linear and concave areas of high-elevation slopes of mountains and hills.



Figure 2. Solifluction lobes are in this ecological site.



Figure 3. Micro-disturbances on these slopes do not affect the overall vegetative community.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Empetrum nigrum</i> (2) <i>Vaccinium vitis-idaea</i>
Herbaceous	(1) <i>Anthoxanthum monticola subsp. alpinum</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).

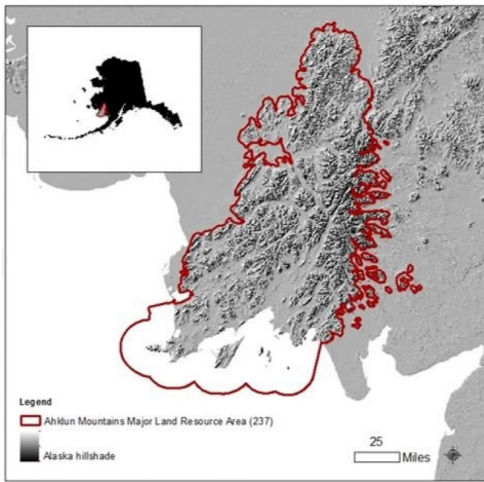


Figure 4. The Ahklun Mountains area (MLRA 237) is in western Alaska.

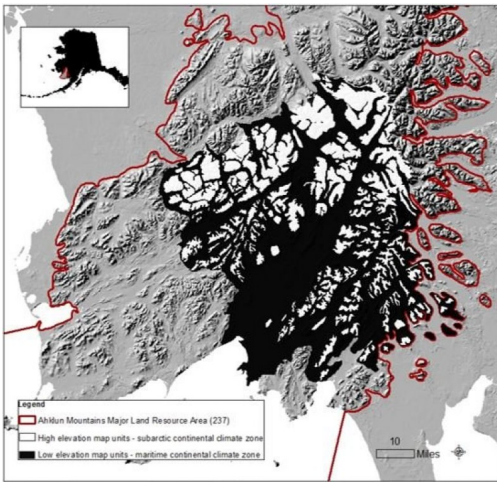


Figure 5. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 2. Representative physiographic features

Slope shape across	(1) Concave
Slope shape up-down	(1) Linear
Landforms	(1) Mountains > Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	201–1,250 m
Slope	10–60%
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 3. Representative climatic features

Frost-free period (characteristic range)	60-125 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

Influencing water features

This ecological site is not subject to ponding because of the slope and natural drainage class of the soils. Snowmelt and precipitation may cause subsurface movement of moisture downslope. Subsurface moisture above the paralithic bedrock likely contributes to the soil creep observed in this ecological site. Soil creep does not result in a distinct community phase; the dense, hardy ericaceous plant community remains stable.

Soil features

There are two soils correlated with this ecological site.

The well drained Outuchiwenat soil is correlated to this ecological site. The saturated hydraulic conductivity of this soil is high. Paralithic bedrock typically is at a depth of 20 to 40 inches. The soil ranges from strongly acid in the upper part to slightly acid in the lower part.

R237XY218AK is also correlated with E37-Maritime scrub-gravelly colluvial slopes. This is a STATSGO-level soil component that covers the same mountain landforms as Outuchiwenat, but in areas mapped at a larger scale (NRCS mapping order 5).

Table 4. Representative soil features

Drainage class	Well drained
Depth to restrictive layer	51–102 cm

Ecological dynamics

Various ecological sites are on mountains in MLRA 237. Site R237XY217AK is on summits and shoulders at the highest elevations. Site R237XY219AK is on very steep backslopes. Site R237XY206AK is in drainageways, and site R237XY205AK is in swales that dissect the other ecological sites. Low-elevation slopes support various other ecological sites, including R237XY202AK and R237XY204AK.

Ecological site R237XY218AK is in concave areas of backslopes on the middle third of the mountains in the northern half of MLRA 237 (figs. 1 and 4). Elevation, landform, and soil characteristics influence this ecological site. The reference plant community supports both low-elevation and alpine species. The concave slopes help to prevent winds from scouring the soil and vegetation. The site is not subject to ponding because of the slope and natural drainage class of the soils. Downslope movement of water through the soil may occur during snowmelt in spring.

This ecological site supports one plant community consisting of dense, hardy, ericaceous plants that help to stabilize the slopes. The soils associated with this site are strongly acid in the upper part, which is typical in areas of ericaceous plant communities (Vioreck et al., 1992). The low pH and natural drainage class of the soil, dense vegetation, and allelopathic effects associated with the *Empetrum* genus appear to prevent colonization by herbaceous plants and larger shrubs (Bråthen et al., 2010; Swanson, 2015). Natural variations in plant richness and cover may be evident in different areas of this ecological site.

Disturbance Dynamics

No disturbances resulting in community phase or state transitions were observed. The small disturbances noted in situ (fig. 3) do not warrant an early community phase. The dense shrubs prevent other species from colonizing, and their roots help to stabilize the soils. Anthropogenic disturbances that remove vegetation, such as construction of trails, may result in erosion that can alter the reference plant community and result in a different plant community.

Hydrological influences

This ecological site is not subject to ponding because of the slope and the natural drainage class of the soil. Snowmelt and precipitation may cause subsurface movement of moisture downslope. Subsurface moisture above the paralithic bedrock likely contributes to the soil creep observed in this ecological site. Soil creep does not result in a distinct community phase; the dense, hardy ericaceous plant community remains stable.

Exposure

High-elevation slopes of mountains may be prone to exposure disturbances, particularly wind erosion. Because this ecological site is in concave areas, it typically is protected from intense winds.

Other Observations

The concave slopes are relatively stable; however, soil creep can occur and solifluction lobes may be present (fig. 2). Where present, these lobes make up a small percent of the total area. A small decrease in species richness can occur on the leading edge of these microfeatures due to a decrease in alpine species, but a separate plant community is not warranted.

Slight grazing of lichen by caribou was noted in the reference plant community. This disturbance appears to be minor and does not result in a separate community phase or state transition.

No alternate states were observed for this ecological site.

State and transition model

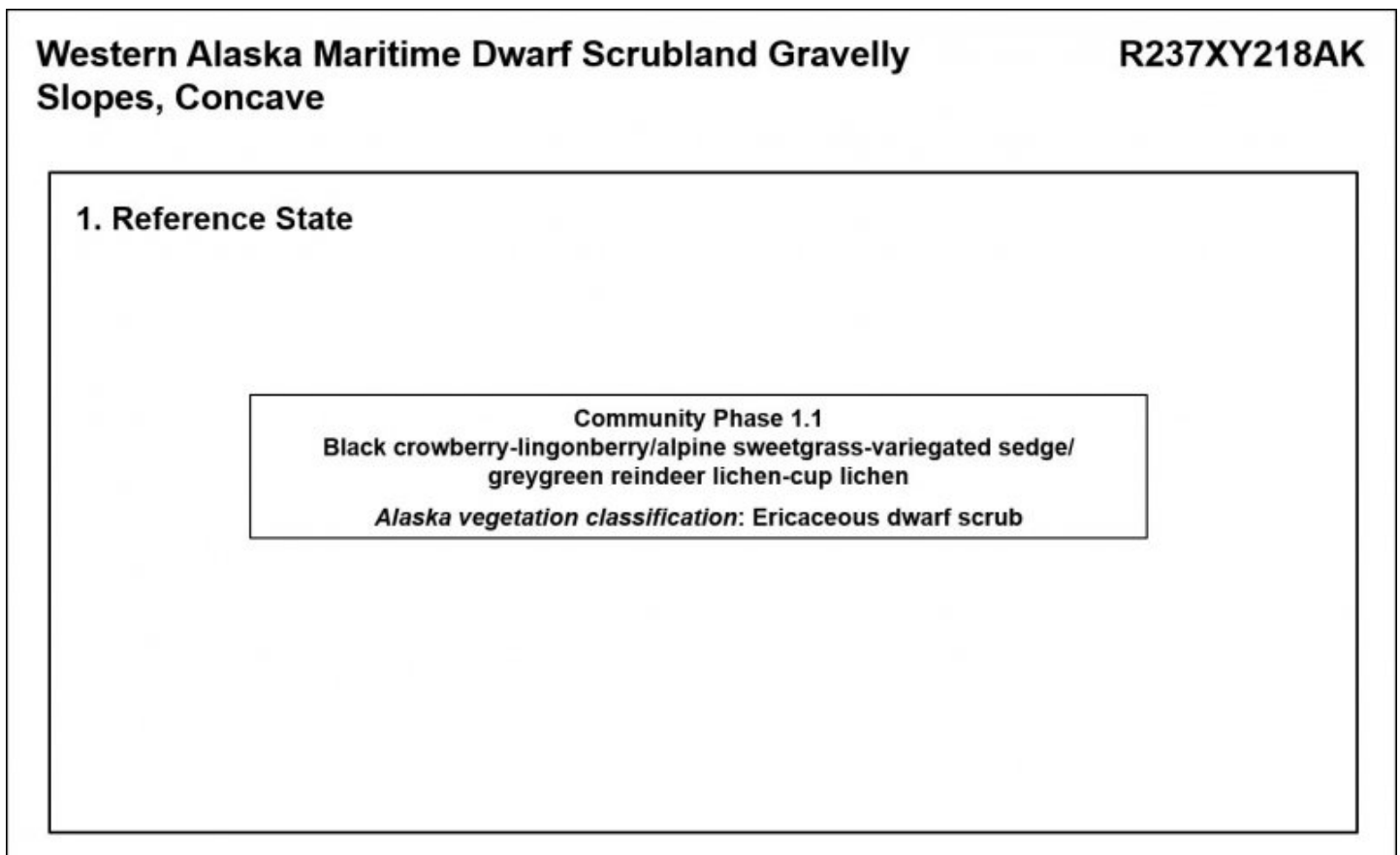


Figure 6. State-and-transition model.

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. 6). The reference community phase is scrubland consisting of shrubs, lichens, graminoids, and mosses. This report provides baseline vegetation inventory data. Future data collection is needed to provide further information about existing plant communities. Common and scientific names are from the USDA PLANTS database. Community phases are characterized by the

Community 1.1

Black crowberry—lingonberry/alpine sweetgrass—variegated sedge/greygreen reindeer lichen—cup lichen (*Empetrum nigrum*—*Vaccinium vitis-idaea*/*Anthoxanthum monticola* ssp. *alpinum*—*Carex stylosa*/*Cladina rangiferina*—*Cladonia* spp.)



Figure 7. Typical area of plant community 1.1.

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)
S	Black crowberry	<i>Empetrum nigrum</i>	EMNI	100	50 (30-70)
S	Lingonberry	<i>Vaccinium vitis-idaea</i>	VAVI	75	4 (0-10)
S	Alaska bellheather	<i>Harrimanella stelleriana</i>	HAST3	50	15 (0-40)
S	Bog blueberry	<i>Vaccinium uliginosum</i>	VALIL	50	4 (0-10)
S	Beauverd spirea	<i>Spiraea stevenii</i>	SPST3	50	3 (0-10)
S	Dwarf birch	<i>Betula nana</i>	BENA	25	8 (0-30)
G	Alpine sweetgrass	<i>Anthoxanthum monticola</i> ssp. <i>alpinum</i>	ANMOA3	50	3 (0-5)
G	Variegated sedge	<i>Carex stylosa</i>	CAST10	25	5 (0-20)
L	Reindeer lichens ^A	<i>Cladina</i> spp.	CLAD13	75	6 (0-20)
L	Greygreen reindeer lichen	<i>Cladina rangiferina</i>	CLRA60	75	6 (0-20)
L	Felt lichen	<i>Peltigera</i> spp.	PELT12	75	2 (0-4)
L	Cup lichens ^{AA}	<i>Cladonia</i> spp.	CLAD13	75	5 (0-15)
L	Cup lichen	<i>Cladonia uncialis</i>	CLUN60	50	4 (0-15)

^AReindeer lichens (*Cladina* spp.) includes all reindeer lichens, including greygreen reindeer lichen.

^{AA}Cup lichens (*Cladonia* spp.) includes all cup lichens, including *Cladonia uncialis*.

This dataset includes data from 35 sample plots. The plots are distributed across the Athkuk 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.

Figure 8. Canopy cover and frequency of species in community 1.1.

The reference plant community is characterized by ericaceous dwarf scrub (Vioreck et al., 1992). The major functional plant groups are dwarf shrubs (less than 8 inches in height), lichens, medium graminoids (between 4 and 24 inches), and mosses. The typical community supports black crowberry, Alaska bellheather, lingonberry, bog blueberry, and dwarf birch (*Betula nana*) interspersed with lichens such as greygreen reindeer lichen (*Cladina rangiferina*) and cup lichen (*Cladonia uncialis*). Graminoids include alpine sweetgrass (*Anthoxanthum monticola* ssp. *alpinum*) and variegated sedge (*Carex stylosa*). These high-elevation, concave areas typically support a mix of both alpine and hydrophilic plants that commonly are not together, including spirea (*Spiraea stevenii*), pincushion plant (*Diapensia lapponica*), Aleutian mountainheath (*Phyllodoce aleutica*), narcissus anemone (*Anemone narcissiflora*), and Canadian burnet (*Sanguisorba canadensis*). The ground cover consists of lichens, herbaceous litter, mosses, and rock fragments. Small 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	05/07/2024
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:**
-