

Ecological site R237XY224AK Western Alaska Maritime Scrubland Gravelly Plains, Berms

Last updated: 7/23/2020
Accessed: 05/20/2024

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. 1). 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. 2). 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 R237XY224AK is on the slightly sloping, leeward side of coastal berms. Landform, location, and soil characteristics combine to create this ecological site. The reference state supports a single reference community. Bulldozing of this site for construction results in an alternate state.

The reference plant community is a shrub tundra consisting of low and dwarf shrub species and interspersed graminoids. Common plants include black crowberry (*Empetrum nigrum*), marsh Labrador tea (*Ledum palustre* ssp.

decumbens), dwarf birch (*Betula nana*), bog blueberry (*Vaccinium uliginosum*), lingonberry (*Vaccinium vitis-idaea*), bluejoint (*Calamagrostis canadensis*), and smallawned sedge (*Carex microchaeta*).

Associated sites

R237XY223AK	Western Alaska Maritime Graminoid Gravelly Plains, Berms The most common associated ecological site is R237XY223AK. This site is adjacent to site R237XY224AK on the windward side of beach berms. 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. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.
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Similar sites

R237XY215AK	Western Alaska Maritime Scrubland Loamy Plains The reference plant community of several ecological sites in the Ahklun Mountains area resembles that of site R237XY224AK. Sites R237XY208AK, R237XY215AK, and R237XY218AK support a scrubland consisting of low and dwarf shrub species. Landform, elevation, and disturbance regime differentiate these sites from site R237XY224AK. Site R237XY224AK is on coastal shore complexes, and the other sites are restricted dominantly to higher elevation mountain slopes and glaciated plains.
R237XY218AK	Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, Concave The reference plant community of several ecological sites in the Ahklun Mountains area resembles that of site R237XY224AK. Sites R237XY208AK, R237XY215AK, and R237XY218AK support a scrubland consisting of low and dwarf shrub species. Landform, elevation, and disturbance regime differentiate these sites from site R237XY224AK. Site R237XY224AK is on coastal shore complexes, and the other sites are restricted dominantly to higher elevation mountain slopes and glaciated plains.
R237XY208AK	Western Alaska Maritime Scrubland Peat Depressions The reference plant community of several ecological sites in the Ahklun Mountains area resembles that of site R237XY224AK. Sites R237XY208AK, R237XY215AK, and R237XY218AK support a scrubland consisting of low and dwarf shrub species. Landform, elevation, and disturbance regime differentiate these sites from site R237XY224AK. Site R237XY224AK is on coastal shore complexes, and the other sites are restricted dominantly to higher elevation mountain slopes and glaciated plains.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Empetrum nigrum</i> (2) <i>Ledum palustre</i> subsp. <i>decumbens</i>
Herbaceous	(1) <i>Calamagrostis canadensis</i> (2) <i>Carex microchaeta</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).

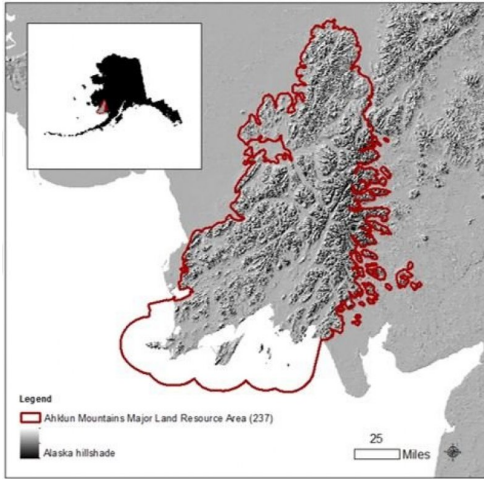


Figure 1. The Ahklun Mountains area (MLRA 237) is in western Alaska.

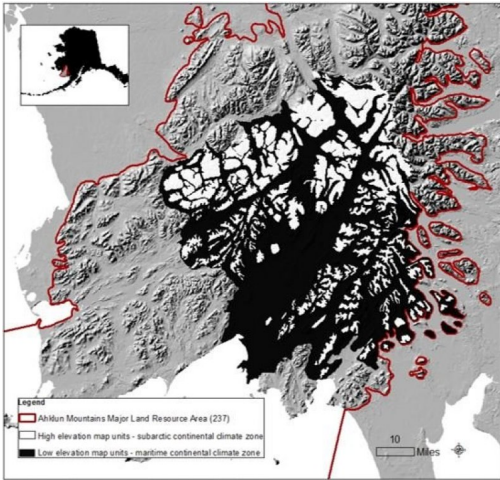


Figure 2. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 2. Representative physiographic features

Slope shape across	(1) Linear
Slope shape up-down	(1) Linear
Landforms	(1) Shore complex > Berm
Flooding frequency	Rare
Ponding frequency	None
Elevation	0–5 m
Slope	1–3%
Water table depth	13–99 cm
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)	85-140 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

Influencing water features

Soil features

Oxyaquic Cryorthents are correlated to this ecological site. These soils are moderately well drained and have moderately high to very high saturated hydraulic conductivity. The range in texture and stratification of these soils is a result of differences in the intensity of flooding and the energy of waves. The soils are slightly acid to very strongly acid.

Table 4. Representative soil features

Drainage class	Moderately well drained
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Ecological dynamics

Shore complexes consist of depressions, talfs, and rises. The depressions and talfs support two ecological sites based on whether the soils are proximal to a tidal channel (R237XY236AK) or distal (R237XY208AK). Rises are differentiated by slope length and gradient. Site R237XY224AK is on gentle slopes of wide leeward berms, and site R237XY223AK is on windward rises that have short vertical slopes and long horizontal slopes.

Site R237XY224AK is on gentle slopes of wide beach berms slightly inland from the beach. The reference state is a dense ericaceous tundra plant community. The soils associated with the site are slightly acid to very strongly acid. Acidic soils commonly are associated with ericaceous shrub communities (Viereck et al., 1992). The low pH and natural drainage class of the soils, 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). These factors and lack of a pronounced disturbance regime result in a resilient reference state that does not exhibit an early community phase. Natural variations in plant richness and cover may be evident among areas of this site.

Disturbance Dynamics

No known disturbance regime in this ecological site results in an early community phase. These wide, gently sloping, commonly leeward beach berms generally are protected from coastal flooding and salt spray by the berms and vegetative communities of site R237XY223AK. Although this site may be subject to strong winds, this disturbance does not result in the site surpassing the resilience threshold required to create an early sere. Anthropogenic disturbances that remove vegetation, such as construction of trails, may promote further disturbances such as erosion that can alter the reference plant community and result in a separate community.

Flooding

This site is subject to rare (1 to 5 times every 100 years) periods of flooding; however, the flooding does not appear to affect the vegetation. A water table is near the surface for a short time in April as the ground thaws and seasonal frost retreats. This may affect the plants that can grow in this site, but it does not create an early sere.

Fire

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

Other Observations

No grazing or browsing was observed in this ecological site. This likely is due to the proximity of the site to coastal villages rather than a lack of edible plants.

One alternate state is in this ecological site. Villages such as Togiak were built on berms. Bulldozing and construction alter the soil surface and lead to a distinct alternate state plant community.

State and transition model

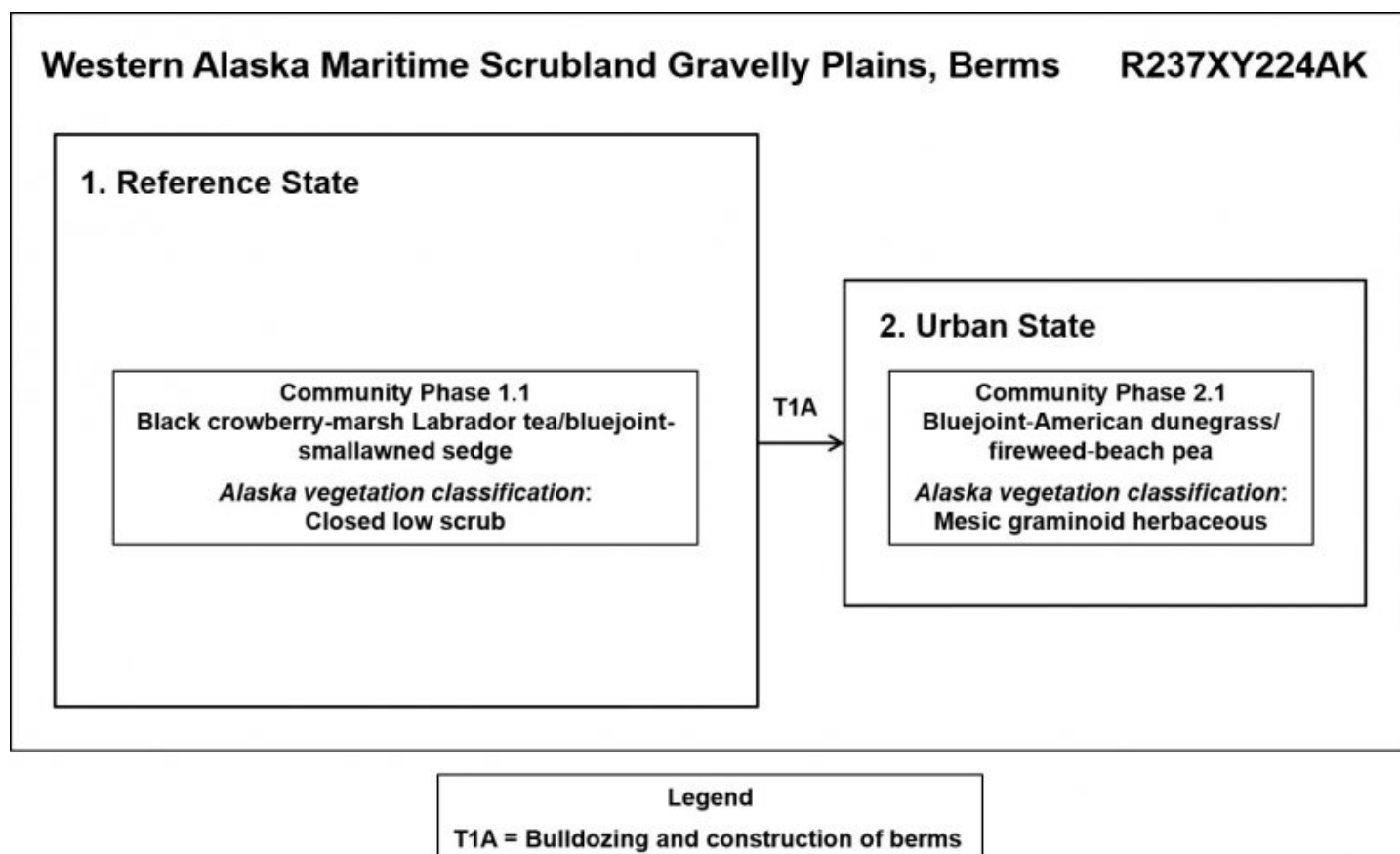


Figure 3. State-and-transition model.

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. 3). The reference plant community is a shrub tundra. 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. All community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1

Black crowberry-marsh Labrador tea/bluejoint-smallawned sedge (*Empetrum nigrum*-*Ledum palustre* ssp. *decumbens*/*Calamagrostis canadensis*-*Carex microchaeta*)



Figure 4. Typical area of scrubland.

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.

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
S	Black crowberry	<i>Empetrum nigrum</i>	EMNI	100	70
S	Marsh Labrador tea	<i>Ledum palustre</i> ssp. <i>decumbens</i>	LEPAD	100	15
S	Lingonberry	<i>Vaccinium vitis-idaea</i>	VAVI	100	10
S	Dwarf birch	<i>Betula nana</i>	BENA	100	2
F	Cloudberry	<i>Rubus chamaemorus</i>	RUCH	100	1
G	Bluejoint	<i>Calamagrostis canadensis</i>	CACA4	100	5
G	Smallawned sedge	<i>Carex microchaeta</i>	CAMI4	100	3

This dataset includes data from one sample plot. Due to the limited data available for this plant community phase, personal field observations were used to aid in describing the community.

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 5. Canopy cover and frequency of species in community 1.1.

The reference plant community is characterized as closed low scrub (fig. 4) (Viereck et al., 1992). The major functional groups are dwarf shrubs (less than 8 inches in height), low shrubs (8 to 36 inches), mosses, and tall graminoids (more than 2 feet) (fig. 5). Typically, the community consists of black crowberry, marsh Labrador tea, lingonberry, dwarf birch, bluejoint, and smallawned sedge. Other species include tealeaf willow (*Salix pulchra*), bog blueberry, false toadflax (*Geocaulon lividum*), and cloudberry (*Rubus chamaemorus*). The ground cover consists of mosses, a small amount of lichens, and herbaceous litter.

State 2

Urban State

This alternate state commonly results from bulldozing coastal rises for use as construction sites. Some coastal villages, such as Togiak, were built on berms. It is unlikely that a natural transition back to the reference state can occur after bulldozing. No browsing is associated with this alternate state.

Community 2.1

Bluejoint-American dunegrass/fireweed-beach pea (*Calamagrostis canadensis*-*Leymus mollis*/Chamerion angustifolium-Lathyrus japonicus ssp. maritimus)



Figure 6. The plant community in areas bulldozed for construction is different than the reference plant community.

frequency (percent) and mean canopy cover (percent) of the most dominant and 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)
G	Bluejoint	<i>Calamagrostis canadensis</i>	CACA4	100	50
G	American dunegrass	<i>Leymus mollis</i>	LEMO8	100	10
F	Fireweed	<i>Chamerion angustifolium</i>	CHAN9	100	25
F	Woolly geranium	<i>Geranium erianthum</i>	GEER2	100	15
F	Beach pea	<i>Lathyrus japonicus</i> var. <i>maritimus</i>	LAJAM	100	7
F	Common yarrow	<i>Achillea millefolium</i>	ACMI2	100	4

This dataset includes data from one sample plot. Due to the limited data available for this community phase, personal field observations were used to aid in describing this plant community.

Plant functional group classifications—T = trees, S = shrubs, G = graminoids, F = forbs, B = bryophytes, L = lichens

Figure 7. Canopy cover and frequency of species in community 2.1.

This community is characterized as mesic herbaceous graminoid (fig. 6) (Viereck et al., 1992). The major functional plant groups include tall graminoids (more than 2 feet in height), dwarf shrubs (less than 8 inches), and tall forbs (more than 2 feet) (fig. 7). This community typically consists of a mix of bluejoint and American dunegrass (*Leymus mollis*), which is affected by the proximity to the ocean. Forbs include fireweed (*Chamerion angustifolium*), woolly geranium (*Geranium erianthum*), beach pea (*Lathyrus japonicus* var. *maritimus*), and common yarrow (*Achillea millefolium*). Shrubs typically are not in this community. The ground cover commonly is herbaceous litter. Some areas are bare soil.

Transition T1A State 1 to 2

This transition is caused by bulldozing for use as construction sites. If the bulldozed areas are not built on or paved, they will be colonized quickly by disturbance-loving species that can survive on or near coastal habitats.

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	05/20/2024
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:
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17. **Perennial plant reproductive capability:**
-