Ecological site R237XY203AK
Western Alaska Maritime Scrubland Gravelly Drainage, Escarpment

Last updated: 7/23/2020
Accessed: 04/20/2024

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. 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 R237XY203AK is on steep escarpments throughout the Ahklun Mountains area. These escarpments are on both sides of drainageways that dissect lowland plains. Landform and soil characteristics influence the plant composition and create a unique ecological site. The reference state supports two community phases dictated by erosion processes, including the reference plant community and an early erosion community phase. No alternate states are recorded for this ecological site.

The reference plant community is a closed tall scrubland (Viereck et al., 1992) that consists dominantly of alder (Alnus spp.) and an understory of shade-tolerant forbs and graminoids.

Associated sites

R237XY208AK	**Western Alaska Maritime Scrubland Peat Depressions** Site R237XY203AK is associated with drainageways that dissect lowland plains. Other sites on lowland plains include R237XY208AK, R237XY210AK, R237XY212AK, and R237XY226AK. These sites are on flood plains and shore complexes. They are easily 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 R237XY203AK is associated with drainageways that dissect lowland plains. Other sites on lowland plains include R237XY208AK, R237XY210AK, R237XY212AK, and R237XY226AK. These sites are on flood plains and shore complexes. They are easily 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 R237XY203AK is associated with drainageways that dissect lowland plains. Other sites on lowland plains include R237XY208AK, R237XY210AK, R237XY212AK, and R237XY226AK. These sites are on flood plains and shore complexes. They are easily differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants.
R237XY226AK	**Western Alaska Maritime Grassland Peat Flood Plains, Depression** Site R237XY203AK is associated with drainageways that dissect lowland plains. Other sites on lowland plains include R237XY208AK, R237XY210AK, R237XY212AK, and R237XY226AK. These sites are on flood plains and shore complexes. They are easily differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants.

Similar sites

R237XY202AK	**Western Alaska Maritime Mosaic Gravelly Slopes** Site R237XY202AK supports a community phase of alder, ferns, and bluejoint; however, it is on low-elevation mountains and hills, has a mosaic of two communities, and is not subject to a disturbance regime. Site R237XY203AK supports an early phase associated with erosion.
R237XY230AK	**Western Alaska Maritime Scrubland Silty Plains and Mountain Slopes, Lower** Site R237XY230AK supports a community similar to that of the reference plant community of site R237XY203AK. Although the reference plant communities are similar, these ecological sites are on different landforms and undergo different disturbances. Site R237XY203AK is subject to erosion, but site R237XY230AK is in areas of wetter soils in swales and a water table is the main driver for the composition of the vegetative community. These differences may result in differences in the overall production of the community, which was not recorded in situ. Separate ecological sites are required because of differences in landform, plant communities, and disturbances.

Figure 1. The steep escarpments support dense stands of alder and an understory of shade-tolerant forbs and graminoids.

Figure 2. Alder on steep escarpments of a drainageway that bisects a plain.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Alnus* (2) *Sambucus racemosa*
Herbaceous	(1) *Dryopteris expansa* (2) *Calamagrostis canadensis*

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).

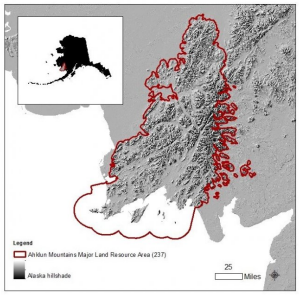

Figure 3. The Ahklun Mountains area (MLRA 237) is in western Alaska.

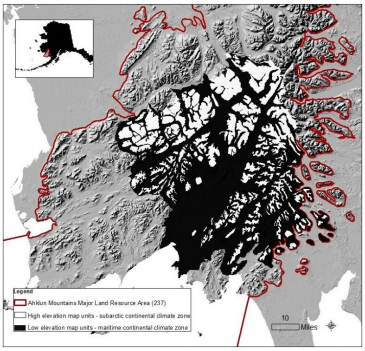

Figure 4. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 2. Representative physiographic features

Slope shape across	(1) Linear
Slope shape up-down	(1) Linear
Geomorphic position, hills	(1) Side Slope
Landforms	(1) Plains > Escarpment (2) Hills > Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	15–2,700 ft
Slope	45–75%
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)	75-135 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

Influencing water features

Soil features

The Atayak soils are correlated to this ecological site. These soils are well drained. The saturated hydraulic conductivity is high in the upper part. The soils are strongly acid to extremely acid in the upper part and moderately acid or strongly acid in the lower part. They are deep to lithic bedrock.

Table 4. Representative soil features

Drainage class	Well drained

Ecological dynamics

Site R237XY203AK is on escarpments of drainageways that dissect plains throughout the Ahklun Mountains area. Slope magnitude and stability and soil characteristics influence the vegetative communities. Erosion on the steep slopes of the escarpments results in a single early community phase. Landslides remove much of the vegetation from affected areas, exposing bare soil, rock fragments, and bedrock. Pioneer species will colonize and plants that spread and grow more slowly will continue to colonize until eventually the plant community once again represents the reference plant community.

Disturbance Dynamics

Erosion

Erosion is the major disturbance in this ecological site, and it can result in a single early community phase. Bare soil, rock fragments, and bedrock commonly remain after major erosion such as a landslide. Pioneer species, including alder and forbs, colonize the exposed slopes. Alder thrives in nutrient-poor soils. It can fix nitrogen and be supported by a shallow root system. As alder spreads, it shades and crowds out most other pioneer species. This transforms the understory and eventually returns the vegetation to the reference plant community.

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 major causes of wildfires in the Ahklun Mountains area are lightning strikes and human activity (AICC, 2017).

Hydrological influences

No evidence of a water table influencing this ecological site was observed. The well drained soils on these steep slopes do not funnel or pond water.

Other observations

No evidence of browsing or grazing in this ecological site was observed.

No alternate states were observed for this ecological site.

State and transition model

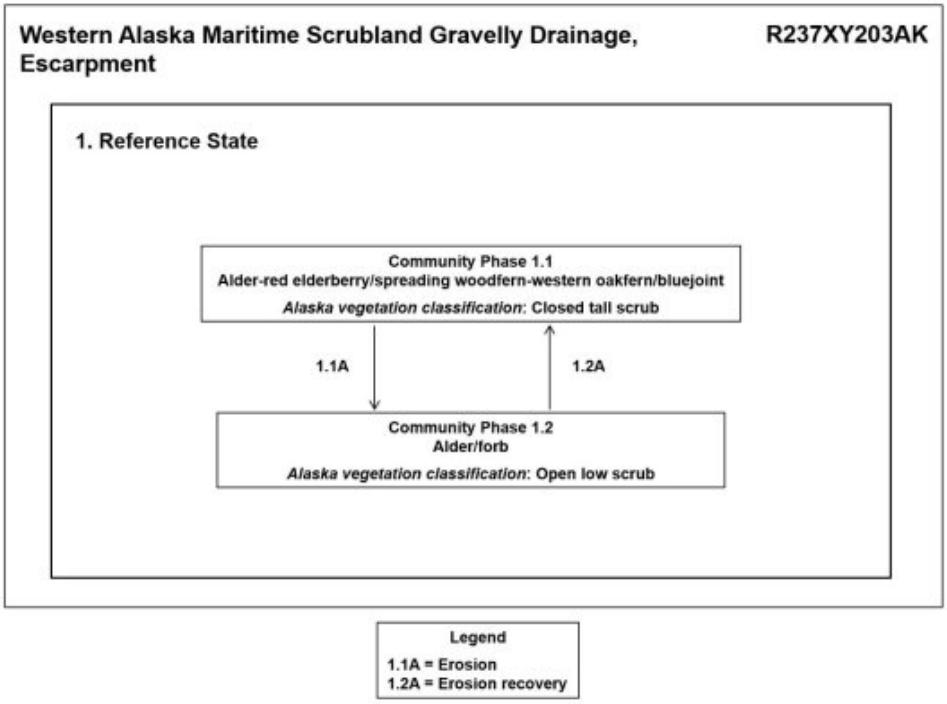

Figure 5. State-and-transition model.

State 1
Reference State

The reference state supports two community phases that are distinguished by the developed structure and dominance of the vegetation and the ecological function and stability of the community (fig. 5). The reference community phase is scrubland that has shade-tolerant forbs and graminoids in the understory. This report provides baseline vegetation inventory data. Future data collection is needed to provide further information about existing plant communities and the disturbance regime that results in transitions from one community to another. 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
Alder-red elderberry/spreading woodfern-western oakfern/bluejoint (Alnus spp.-Sambucus racemosa/Dryopteris expansa-Gymnocarpium dryopteris-Calamagrostis canadensis)

Figure 6. The escarpments typically support dense stands of alder.

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	Alder	*Alnus spp.*	ALNUS	100	85 (75-95)
S	Red elderberry	*Sambucus racemosa*	SARA2	50	8 (0-20)
G	Bluejoint	*Calamagrostis canadensis*	CACA4	100	6 (0.1-10)
F	Spreading woodfern	*Dryopteris expansa*	DREX2	100	60 (40-80)
F	Western oakfern	*Gymnocarpium dryopteris*	GYDR	75	3 (0-5)
F	Claspleaf twistedstalk	*Streptopus amplexifolius*	STAM2	75	1 (0-2)

This dataset includes data from four sample plots. The 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.

Figure 7. Canopy cover and frequency of plant species in community 1.1.

The reference community phase is characterized as closed tall scrubland (Viereck et al., 1992). The major vegetative strata are tall shrubs (more than 10 feet in height), tall graminoids (more than 24 inches), and tall and medium forbs (4 to 24 inches or more) (fig. 7). The plant community commonly consists of thinleaf alder (*Alnus incana* ssp. tenuifolia) and Sitka alder (*Alnus viridis* ssp. sinuata), patches of red elderberry (*Sambucus racemosa*), and an understory of spreading woodfern (*Dryopteris expansa*), western oakfern (*Gymnocarpium dryopteris*), and bluejoint (*Calamagrostis canadensis*). Other shade-tolerant forbs and graminoids such as common ladyfern (*Athyrium filix-femina*), claspleaf twistedstalk (*Streptopus amplexifolius*), and spirea (*Spiraea stevenii*) may be present. The ground cover commonly includes herbaceous and woody litter, ground moss, and rock fragments. Some areas are bare soil.

Community 1.2
Alder (Alnus spp.)/forb

Figure 8. Community 1.2 is in areas that have been subject to erosion (background).

This early erosion community phase is characterized by open areas of bare soil, rock fragments, and bedrock and colonizing alder and pioneer forb species. The pioneer species may include those that can fix nitrogen or thrive in low-nutrient environments. Alder is expected to colonize quickly and become dominant on the eroded slopes in a relatively short time. This community phase was not sampled.

Pathway 1.1A
Community 1.1 to 1.2

Alder-red elderberry/spreading woodfern-western oakfern/bluejoint (Alnus spp.-Sambucus racemosa/Dryopteris expansa-Gymnocarpium dryopteris-Calamagrostis canadensis)

Alder (Alnus spp.)/forb

Erosion.

Pathway 1.2A
Community 1.2 to 1.1

Alder (Alnus spp.)/forb

Alder-red elderberry/spreading woodfern-western oakfern/bluejoint (Alnus spp.-Sambucus racemosa/Dryopteris expansa-Gymnocarpium dryopteris-Calamagrostis canadensis)

Natural succession: Normal time without disruptive erosion.

Additional community tables

Other references

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Contributors

Kendra Moseley
Sue Tester
Michael Margo
Stephanie Schmit
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	04/20/2024
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):**

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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:**
