Ecological site R237XY226AK
Western Alaska Maritime Grassland Peat Flood Plains, Depression

Last updated: 7/23/2020
Accessed: 05/17/2024

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 R237XY226AK is in organic soil depressions of lowland flood plains. The reference state supports a single community, which is the reference plant community. Ponding and flooding help to sustain the reference plant community. An alternate state is a result of beaver activity.

The reference plant community is a wet sedge-herb meadow tundra (Viereck et al., 1992). Common obligate wetland graminoids are water sedge (*Carex aquatilis*) and beaked sedge (*C. rostrata*), and common hydrophilic

forbs are water horsetail (*Equisetum fluviatile*) and purple marshlocks (*Comarum palustre*). Other common species include arctic sweet coltsfoot (Petasites frigidus) and western water hemlock (Cicuta douglasii).

Associated sites

R237XY210AK	**Western Alaska Maritime Scrubland Gravelly Flood Plains** Ecological site R237XY226AK is on flood plains. Associated sites on flood plains include R237XY210AK, R237XY211AK, and R237XY212AK. Site R237XY226AK is differentiated from these sites by landform, slope shape, soils, and disturbances. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut. This is especially noticeable in smaller depressions because the edge effects are relatively large or make up the total area and species from surrounding ecological sites may intermix.
R237XY211AK	**Western Alaska Maritime Scrubland Loamy Flood Plains** Ecological site R237XY226AK is on flood plains. Associated sites on flood plains include R237XY210AK, R237XY211AK, and R237XY212AK. Site R237XY226AK is differentiated from these sites by landform, slope shape, soils, and disturbances. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut. This is especially noticeable in smaller depressions because the edge effects are relatively large or make up the total area and species from surrounding ecological sites may intermix.
R237XY212AK	**Western Alaska Maritime Scrubland Silty Flood Plains** Ecological site R237XY226AK is on flood plains. Associated sites on flood plains include R237XY210AK, R237XY211AK, and R237XY212AK. Site R237XY226AK is differentiated from these sites by landform, slope shape, soils, and disturbances. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut. This is especially noticeable in smaller depressions because the edge effects are relatively large or make up the total area and species from surrounding ecological sites may intermix.

Similar sites

R237XY205AK	**Western Alaska Maritime Scrubland Loamy Swales** Although site R237XY205AK is similar to site R237XY226AK, site R237XY205AK is in swales that are not subject to ponding and are not susceptible to beaver damming. Site R237XY205AK supports willows and bluejoint in the reference plant community, which are not in site R237XY226AK. Differences in soils and disturbance regimes lead to different reference state communities.
R237XY208AK	**Western Alaska Maritime Scrubland Peat Depressions** Sites R237XY226AK and R237XY208AK are in depressions, and both support a variety of hydrophilic plant species. Site R237XY226AK is in mineral soil depressions of flood plains, and site R237XY208AK is in organic depressions of low- and high-elevation glaciated plains. Differences in soils and disturbance regimes lead to different reference state communities.

Figure 1. Willows encroach on the reference plant community in some areas.

Figure 2. View of alternate beaver-affected state. Multiple beaver dams and lodges are in the large depressions. Beaver dams are at far left and just out of view on right.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Carex* (2) *Comarum palustre*

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).

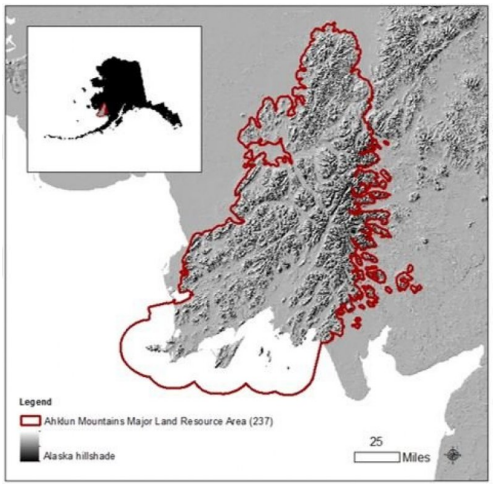


Figure 3. The Ahklun Mountains area (MLRA 237) is in western Alaska.

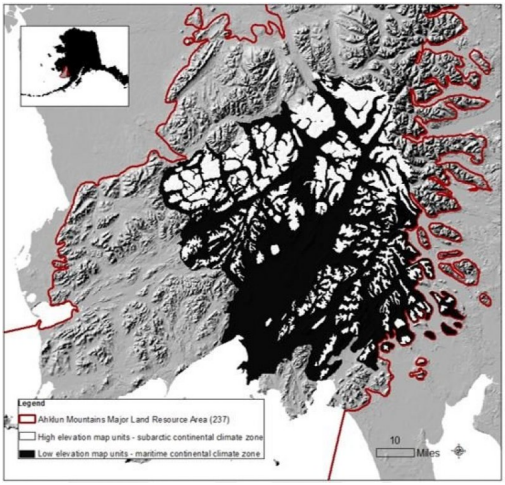


Figure 4. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 2. Representative physiographic features

Slope shape up-down	(1) Concave
Slope shape across	(1) Concave
Landforms	(1) Lowland > Flood plain
Flooding frequency	Rare
Ponding duration	Very long (more than 30 days)
Ponding frequency	Frequent
Elevation	9–671 m
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)	75-130 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

Influencing water features

Soil features

Histosols are correlated to this ecological site. The saturated hydraulic conductivity of the soils is moderately high in the upper 12 inches and very high below that depth. These soils are very poorly drained.

Table 4. Representative soil features

Drainage class	Very poorly drained

Ecological dynamics

Flood plains are throughout the Ahklun Mountains area. The ecological sites on the flood plains differ in location, landform, elevation above the flood source, soil characteristics, and disturbance regime. Flood plain depressions that experience very long ponding support a unique reference state that is differentiated by soil characteristics, disturbance regime, and landform.

Site R237XY226AK is in organic soil depressions of flood plains. These depressions are wet and have a year-round water table at the soil surface, limiting the plants that can grow. The soil associated with this site is very poorly drained. The reference state supports one stable reference plant community. The site is subject to ponding and flooding. Plants are primarily obligate wetland species that are tolerant of ponding and low-energy flooding. Obligate wetland species thrive in wet soils where the high content of soil moisture excludes less hydrophilic plant species. Willow may encroach on this site (fig. 1), but it is too wet to support a willow scrubland community. More willow could colonize this site if it dried, but this was not recorded in situ.

Disturbance Dynamics

No disturbance regime in this ecological site results in an early community phase.

Ponding
Depressions of the flood plains are wet. The soils are very poorly drained, and a water table is at the soil surface throughout the year. Frequent, very long periods (more than 30 days) of ponding occur during the growing season. Ponding affects the plant community by inhibiting oxygen to susceptible plants (Hook and Crawford, 1978; Jackson et al., 1991). Hypoxic and anoxic conditions are major stressors and partially determine the presence or absence of vascular plants. The temporal tolerance to oxygen deprivation differs among plant species, ranging from many hours to several weeks (Vartapetian and Jackson, 1996). The reference plant community dominantly supports obligate wetland species, which are resilient to ponding. Ponding does not result in an early community sere.

Flooding
This site is subject to periodic flooding. The frequency and duration of flooding typically coincide with the local flooding regime of the surrounding flood plains. Flooding does not cause the site to surpass the resilience threshold required to create an early sere.

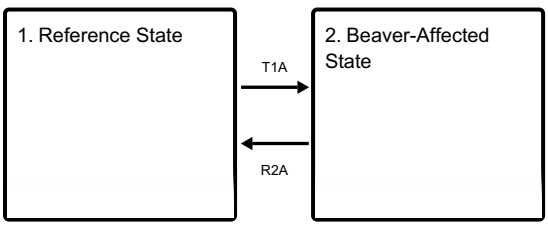
Fire
No incidence or evidence of fire was recorded in situ for this ecological site; however, previous wildfires have been mapped in areas of this site. Historically, the major causes of wildfires in the Ahklun Mountains area are lightning strikes and human activity (AICC, 2017).

Other Observations
No browsing or grazing is evident in the reference state,

One alternate state created by beaver activity is recognized in this ecological site. Beaver activity, particularly dam construction, can restructure the plant community in the depressions. Beavers are an introduced species in the Ahklun Mountains area. The extent of their effect on this site has not been fully researched.

State and transition model

Ecosystem states



T1A - Beaver dam construction

R2A - Hypothetical dam removal

State 1 submodel, plant communities

1.1. Water sedge-beaked sedge/water horsetail-purple marshlocks (Carex aquatilis-Carex rostrata/Equisetum fluviatile-Comarum

State 2 submodel, plant communities

2.1. Water sedge-Lyngbye's sedge/purple marshlocks (Carex aquatilis-Carex lyngbyei/Comarum palustre)

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. 5). The reference community phase is a grassland meadow consisting of hydrophilic graminoids and forbs. 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 Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1
Water sedge-beaked sedge/water horsetail-purple marshlocks (Carex aquatilis-Carex rostrata/Equisetum fluviatile-Comarum palustre)

Figure 5. Typical area of 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.

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
G	Beaked sedge	*Carex rostrata*	CARO6	100	95
G	Water sedge	*Carex aquatilis*	CAAQ	100	70
F	Water horsetail	*Equisetum fluviatile*	EQFL	100	95
F	Purple marshlocks	*Comarum palustre*	COPA28	100	5
F	Western water hemlock	*Cicuta douglasii*	CIDO	100	5
F	Arctic sweet coltsfoot	*Petasites frigidus*	PEFR5	100	5

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

The reference plant community is characterized as wet graminoid herbaceous (Viereck et al., 1992). The major plant strata are medium forbs (4 to 24 inches in height), dwarf graminoids (less than 4 inches), and medium graminoids (4 to 24 inches). The most prevalent species are obligate wetland graminoids such as water sedge and beaked sedge. Common obligate forbs include water horsetail and purple marshlocks. Species such as arctic sweet coltsfoot and western water hemlock may be present. The ground cover commonly is herbaceous litter and ponded water.

State 2
Beaver-Affected State

This alternate state is the result of beaver activity. Although the depressions typically do not contain flowing water, beavers can use the ponded areas to build dams and lodges (fig. 2), which increases the scale, duration, and depth of ponding. Beavers (Castor canadensis) directly kill shrubs for food and dam material and indirectly kill these species and others by raising the water table (USDA-Forest Service, 2013). Beavers shift the soil material (pond sediment versus alluvium), which can result in spatial and temporal changes in willow establishment and affect the structure of the plant community (Wolf et al., 2007). Changes in the soils and the depth and duration of ponding create a community distinct from the reference plant community. This community typically is around or upstream from beaver ponds in areas where the most ponding occurs. The number and density of wetland species is highest in these areas, which can affect the availability of forage plants for other animal species. No data is available from this region as to whether the plant community will revert to the reference plant community if the dams are removed and no further management is applied. Browsing or grazing by other animals was not evident in this community.

Community 2.1
Water sedge-Lyngbye’s sedge/purple marshlocks (Carex aquatilis-Carex lyngbyei/Comarum palustre)

Figure 7. Typical area surrounding a beaver pond. Dense hydrophilic species thrive in the wet areas.

Community Phase 2.1 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)
G	Water sedge	*Carex aquatilis*	CAAQ	100	50
G	Lyngbye's sedge	*Carex lyngbyei*	CALY3	100	25
G	Bluejoint	*Calamagrostis canadensis*	CACA4	100	5
F	Purple marshlocks	*Comarum palustre*	COPA28	100	5
F	Woolly geranium	*Geranium erianthum*	GEER2	100	1
F	Field horsetail	*Equisetum arvense*	EQAR	100	0.1
F	Dock	*Rumex* spp.	RUMEX	100	0.1

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 8. Canopy cover and frequency of species in community 2.1.

This community is characterized as a wet graminoid herbaceous (Viereck et al., 1992). The major functional groups are tall graminoids (more than 2 feet in height), medium forbs (4 to 24 inches), and mosses. One or more hydrophilic sedges such as water sedge or Lyngbye's sedge and bluejoint (*Calamagrostis canadensis*) typically are present. Willows (Salix spp.) may be present. Typical water-tolerant, hydrophilic forbs include purple marshlocks, field horsetail (*Equisetum arvense*), and docks (Rumex spp.). The ground cover typically includes herbaceous litter, water, and ground mosses.

Transition T1A
State 1 to 2

This transition is caused by the construction of dams by beavers. Areas surrounding beaver ponds support plant assemblages distinct from those of the reference state. This plant community is comprised of species that can grow and reproduce in wet soils. The time required for this transition to occur depends on the amount of activity by beavers.

Restoration pathway R2A
State 2 to 1

Currently, it is unknown whether an area will return to the reference state when a beaver dam is removed. The duration of the dam and the affect on the hydrology of the area may determine whether this process can occur naturally or would require additional management. More observation is needed to determine the effects of dam removal on the plant community.

Additional community tables

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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	05/17/2024
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):**

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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:**
