Ecological site R237XY205AK
Western Alaska Maritime Scrubland Loamy Swales

Last updated: 7/23/2020
Accessed: 06/30/2024

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 R237XY205AK is in swales of glaciated plains and mountains. Landform, soil moisture content, and climatic factors differentiate this ecological site. The reference state supports one plant community, which is the reference community. No alternate states are associated with this ecological site.

The reference plant community is open tall scrubland (Viereck et al., 1992). The community consists dominantly of one or more species of willow (Salix spp.) and an understory of various forbs, graminoids, and non-willow shrubs.

Understory plants may include bluejoint (*Calamagrostis canadensis*), fireweed (*Chamerion angustifolium*), and woolly geranium (*Geranium erianthum*).

Associated sites

R237XY230AK	**Western Alaska Maritime Scrubland Silty Plains and Mountain Slopes, Lower**
R237XY201AK	**Western Alaska Maritime Scrubland Gravelly Slopes**
R237XY202AK	**Western Alaska Maritime Mosaic Gravelly Slopes**
R237XY203AK	**Western Alaska Maritime Scrubland Gravelly Drainage, Escarpment**
R237XY220AK	**Western Alaska Maritime Mosaic Loamy Hummocks**
F237XY239AK	**Boreal Forest Loamy Slopes**
R237XY206AK	**Western Alaska Maritime Dwarf Scrubland Loamy Drainage, High Elevation**
R237XY208AK	**Western Alaska Maritime Scrubland Peat Depressions**
R237XY210AK	**Western Alaska Maritime Scrubland Gravelly Flood Plains**
R237XY211AK	**Western Alaska Maritime Scrubland Loamy Flood Plains**
R237XY212AK	**Western Alaska Maritime Scrubland Silty Flood Plains**
R237XY215AK	**Western Alaska Maritime Scrubland Loamy Plains**
R237XY217AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, High Elevation**
R237XY218AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, Concave**
R237XY222AK	**Western Alaska Maritime Scrubland Loamy Hummocks**
R237XY204AK	**Western Alaska Maritime Scrubland Loamy Slopes** Site R237XY205AK is in swales of mountains and glaciated plains. Common associated sites on these landforms are R237XY201AK, R237XY202AK, R237XY203AK, R237XY204AK, R237XY206AK, R237XY208AK, R237XY210AK, R237XY211AK, R237XY212AK, R237XY215AK, R237XY217AK, R237XY218AK, R237XY220AK, R237XY222AK, F237XY239AK, and R237XY230AK. 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. This is especially noticeable in smaller concave areas that support site R237XY205AK but have species from surrounding ecological sites intermixed.

Similar sites

R237XY206AK	**Western Alaska Maritime Dwarf Scrubland Loamy Drainage, High Elevation** Ecological site R237XY206AK is in high-elevation drainageways, and it supports a reference plant community of willow. Differences in elevation, landform (drainageways versus swales), and disturbance regimes require the use of unique ecological sites (R237XY205AK and R237XY206AK). Various ecological sites on flood plains support one or more willow-dominant communities. The flood plains are subject to hydrologic disturbances, which make separate ecological sites necessary.

Figure 1. This ecological site is in swales. Low and dwarf shrubs from surrounding ecological sites may be intermixed with willow at the edges of the swales.

Figure 2. The reference plant community typically supports dense stands of willow.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix pulchra* (2) *Salix barclayi*
Herbaceous	(1) *Calamagrostis canadensis* (2) *Chamerion angustifolium*

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).

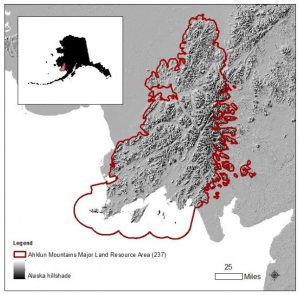

Figure 3. The Ahklun Mountains area (MLRA 237) is in western Alaska.

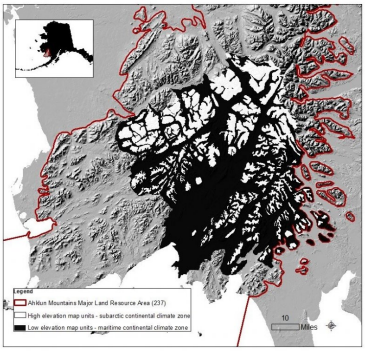

Figure 4. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 2. Representative physiographic features

Slope shape across	(1) Concave
Slope shape up-down	(1) Concave (2) Linear
Landforms	(1) Plains > Swale (2) Mountains > Swale
Flooding frequency	None
Ponding frequency	None
Elevation	0–3,000 ft
Slope	0–35%
Water table depth	0–30 in
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)	70-140 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

Influencing water features

Soil features

The Pegati and Pungokepuk soils are correlated to this ecological site. These soils are somewhat poorly drained or well drained. The saturated hydraulic conductivity of the Pungokepuk soils is moderately high or high in the upper part and high or very high in the lower part. The saturated hydraulic conductivity of the Pegati soils is high or very high in the upper part and moderately high in the lower part. Both soils are strongly acid or very strongly acid in the upper part and moderately acid or slightly acid in the lower part.

Table 4. Representative soil features

Drainage class	Somewhat poorly drained to well drained

Ecological dynamics

R237XY205AK describes swales across a large range of elevations, from glaciated plains to the lower third of mountain slopes, across the Ahklun Mountains. Swales are relatively small in size when compared to the mountain slopes and plains on which they are found. Various other ecological sites may be found on these landforms, but R237XY205AK stands out by supporting a community of obligate to facultative wetland species in concave areas.

Swale community composition is a product of landform, soil, and climate characteristics. Swales collect a thick winter snowpack, unlike the surrounding wind-scoured landscapes. These concave positions provide adequate protection from the wind and adequate soil moisture for a willow community to thrive. Willows are an adaptable group and many species can tolerate a variety of habitats and soil moisture conditions (Anderson and Welsh, 1974; Moore, 2003). The willows in the reference plant community are usually three to ten feet tall, though they are usually shorter at higher elevations. It is likely that community productivity follows an elevation gradient, though plant production was not recorded. If future data shows a significant difference in production along an elevational gradient between mountains and plains, then this ecological site may be divided into two ecological sites.

Disturbance Dynamics

There is no known disturbance in this ecological site that results in an early community phase. The reference plant community is resilient to the disturbance described below. Anthropogenic disturbances that remove vegetation, such as trail building, may promote further disturbances like erosion that can alter the reference plant community and result in a separate plant community.

Hydrological Influences

Precipitation and seasonal snowmelt usually result in a seasonal water table. The reference plant community, comprised of facultative to obligate wetland species, thrives in wet soil and anaerobic conditions, and increases in soil moisture do not meet the resilience threshold required to create an early community phase. Natural variations in plant richness and cover may be evident between landforms, elevations, and drainage classes supporting this ecological site, but not enough to warrant an early community phase or a separate ecological site.

Other Observations
These swales are circular to linear in shape and are typically adjacent to ecological sites that support low and dwarf shrubs. These low and dwarf shrubs can colonize swale edges and push into the reference plant community (fig. 4). These ecotonal edge effects are common.

Slight to moderate browsing by moose and caribou on willow has been documented. These concave, protected areas likely provide shelter for wildlife. Browsing does not appear to influence the plant community in richness or cover in a way that requires an early browsing community phase or alternate state.

No alterative states have been observed for this ecological site.

State and transition model

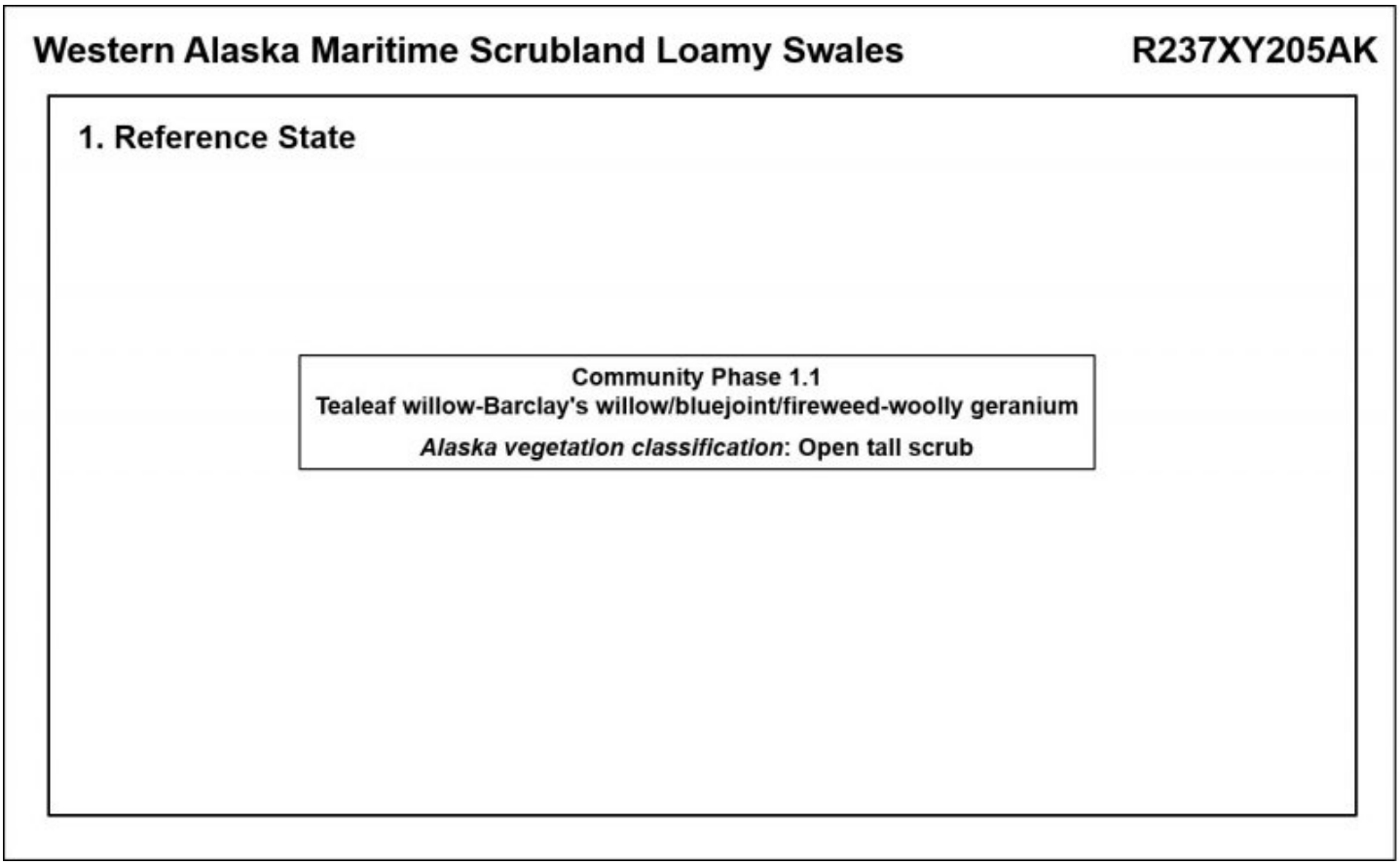

Figure 5. State-and-transition model.

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. 5). The reference community phase is characterized by scrubland that consists primarily of hydrophilic shrubs and forbs and graminoids. This report provides baseline vegetation inventory data. Future data collection is needed to provide further information about existing plant communities and to determine if any disturbance regimes will result in transition the reference plant 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
Tealeaf willow-Barclay's willow/bluejoint/fireweed-woolly geranium (Salix pulchra-Salix barclayi/Calamagrostis canadensis/Chamerion angustifolium-Geranium erianthum)

Figure 6. 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	Willow^	*Salix* spp.	SALIX	100	70 (50-90)
S	Tealeaf willow	*Salix pulchra*	SAPU15	86	35 (0-90)
S	Barclay's willow	*Salix barclayi*	SABA3	71	35 (0-75)
S	Beauverd spirea	*Spiraea stevenii*	SPST3	71	2 (0-15)
G	Bluejoint	*Calamagrostis canadensis*	CACA4	91	25 (0-90)
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	6 (0.1-25)
F	Woolly geranium	*Geranium erianthum*	GEER2	91	2 (0-10)
F	Canadian burnet	*Sanguisorba canadensis*	SACA14	86	4 (0-10)
F	Field horsetail	*Equisetum arvense*	EQAR	43	4 (0-40)
F	Western oakfern	*Gymnocarpium dryopteris*	GYDR	43	3 (0-15)
B	Splendid feather moss	*Hylocomium splendens*	HYSP70	43	5 (0-25)

^Willow (*Salix* spp.) includes all willow species, including Barclay's willow and tealeaf willow.

This dataset includes data from 21 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 species in community 1.1.

The reference plant community is characterized as open tall scrub (fig. 6) (Viereck et al., 1992). The major vegetative strata are medium shrubs (3 to 10 feet in height), tall graminoids (more than 24 inches), and medium forbs (4 to 24 inches) (fig. 7). Willows are common. The stands commonly are a mix of two or more species of willow, but some stands may be monotypic. Tealeaf willow (*Salix pulchra*) and Barclay's willow (*S. barclayi*) are the major species, but greyleaf willow (*S. glauca*) may be present. The understory consists of hydrophilic or shade-tolerant shrubs such as Beauverd spirea (*Spiraea stevenii*) and Lapland cornel (*Cornus suecica*). Other understory species include fireweed, Canadian burnet (*Sanguisorba canadensis*), woolly geranium, western oakfern (*Gymnocarpium dryopteris*), and bluejoint. In smaller swales, species from surrounding plant communities may encroach in the understory. The ground cover typically includes large areas of herbaceous litter and moss and smaller areas of woody litter. Some 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	06/30/2024

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:

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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:**
