USDA Natural Resources Conservation Service

Ecological site R236XY104AK
Alpine Dwarf Scrub Gravelly Slopes

Last updated: 2/13/2024
Accessed: 05/13/2025

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): 236X–Bristol Bay-Northern Alaska Peninsula Lowlands

The Bristol Bay-Northern Alaska Peninsula Lowland Major Land Resource Area (MLRA 236) is located in Western Alaska. This MLRA covers approximately 19,500 square miles and is defined by an expanse of nearly level to rolling lowlands, uplands and low to moderate hills bordered by long, mountain footslopes. Major rivers include the Egegik, Mulchatna, Naknek, Nushagak, and Wood River. MLRA 236 is in the zone of discontinuous permafrost. It is primarily in areas with finer textured soils on terraces, rolling uplands and footslopes. This MLRA was glaciated during the early to middle Pleistocene. Moraine and glaciofluvial deposits cover around sixty percent of the MLRA. Alluvium and coastal deposits make up a large portion of the remaining area (Kautz et al., 2012; USDA, 2006).

Climate patterns across this MLRA shift as one moves away from the coast. A maritime climate is prominent along the coast, while continental weather, commonly associated with Interior Alaska, is more influential inland. Across the MLRA, summers are general short and warm while winters are long and cold. Mean annual precipitation is 13 to 50 inches, with increased precipitation at higher elevations and areas away from the coast. Mean annual temperatures is between 30 and 36 degrees F (USDA, 2006).

The Bristol Bay-Northern Alaska Peninsula MLRA is principally undeveloped wilderness. Federally managed land includes parts of the Katmai and Aniakchak National Parks, and the Alaska Peninsula, Becharof, Togiak and Alaska Maritime National Wildlife Refuges. The MLRA is sparsely populated. Principal communities include Dillingham, Naknek, and King Salmon. Commercial fishing in Bristol Bay and the Bering Sea comprises a major part of economic activity in the MLRA. Other land uses include subsistence activities (fishing, hunting, and gathering) and sport hunting and fishing (USDA, 2006).

Ecological site concept

This high elevation ecological site is on exposed hill and mountain summits and shoulders. Site elevation is between 1,000 and 3,000 feet above sea level. Slopes are nearly level on summits and can be steep on shoulders. Soils are weakly developed and have an ochric epipedon and cambic horizon. Soil conditions and abiotic site characteristics such as elevation and wind exposure shape site vegetation.

The reference state supports one community. The reference plant community is a dwarf ericaceous shrubland (Viereck et al., 1992). It is composed of a mix of prostrate ericaceous shrubs with sparse, fast-growing forbs and graminoids throughout.

Associated sites

R236XY102AK	**Subarctic Dwarf Scrub Gravelly Slopes** Site R236XY102AK (Western Alaska Maritime Dwarf Scrub Gravelly Slopes) is in depressions of mountains.

R236XY105AK	**Subarctic Scrub Mosaic Gravelly Hillslopes** Site R236XY105AK (Western Alaska Maritime Mosaic Loamy Slopes) is on backslopes of mountains.
R236XY106AK	**Subarctic Dwarf Scrub Dry Loamy Slopes** Site R236XY106AK (Western Alaska Maritime Dwarf Scrub Loamy Slopes, Dry) typically is on footslopes of mountains.

Similar sites

R236XY102AK	**Subarctic Dwarf Scrub Gravelly Slopes** The reference plant community of site R236XY102AK is similar to that of site R236XY104AK. Site R236XY104AK is in exposed areas of mountains. The plants typically are stunted, and rock fragments are on the surface in some areas. The shrubs in site R236XY102AK commonly form dense hummocks.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Empetrum nigrum* (2) *Vaccinium uliginosum*
Herbaceous	(1) *Carex microchaeta subsp. nesophila*

Physiographic features

This site is on broad, linear to convex summits and shoulders of hills and mountains. Elevation typically ranges from around 1,000 to 3,200 feet (approximately 500 – 3,200 feet max) above sea level. Slopes are nearly level on summit positions and can be steep on shoulders (1 – 50 percent). This site is found at all aspects. There is no water table on this site and ponding and flooding are absent.

Table 2. Representative physiographic features

Geomorphic position, mountains	(1) Upper third of mountainflank
Hillslope profile	(1) Shoulder (2) Summit
Landforms	(1) Mountains > Mountain slope (2) Hills > Hillslope
Runoff class	Low to high
Flooding frequency	None
Ponding frequency	None
Elevation	305–914 m
Slope	1–50%
Water table depth	Not specified
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Low to high
Flooding frequency	None
Ponding frequency	None
Elevation	143–994 m
Slope	1–50%
Water table depth	Not specified

Climatic features

The climate of this site reflects that of the MLRA, which is described as maritime polar (EPA, 2013). Temperatures are moderated by the nearby Bristol Bay and norther Pacific bodies of water. Annual precipitation ranges from 21 – 34 inches with approximately 40 percent occurring during the June-September growing season (PRISM, 2018).

Table 4. Representative climatic features

Frost-free period (characteristic range)	75-100 days
Freeze-free period (characteristic range)	65-90 days
Precipitation total (characteristic range)	533-864 mm
Frost-free period (actual range)	75-100 days
Freeze-free period (actual range)	65-90 days
Precipitation total (actual range)	381-1,041 mm
Frost-free period (average)	90 days
Freeze-free period (average)	75 days
Precipitation total (average)	737 mm

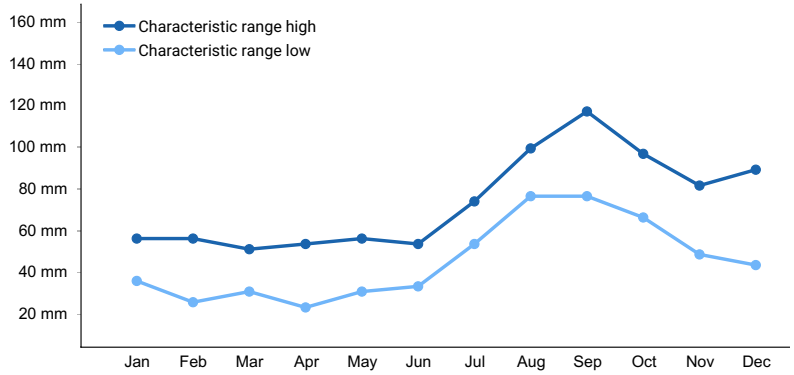

Figure 1. Monthly precipitation range

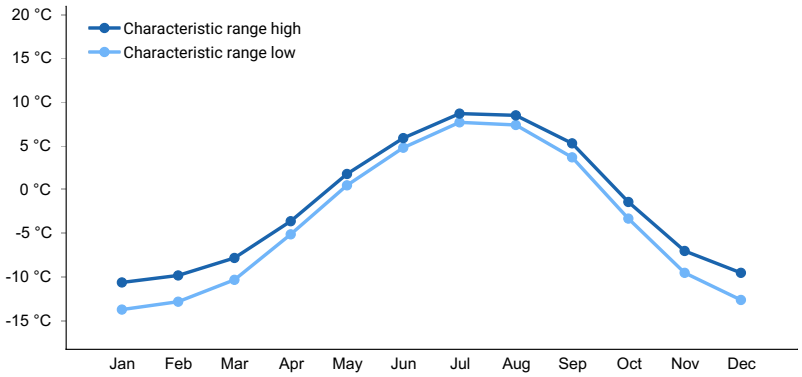

Figure 2. Monthly minimum temperature range

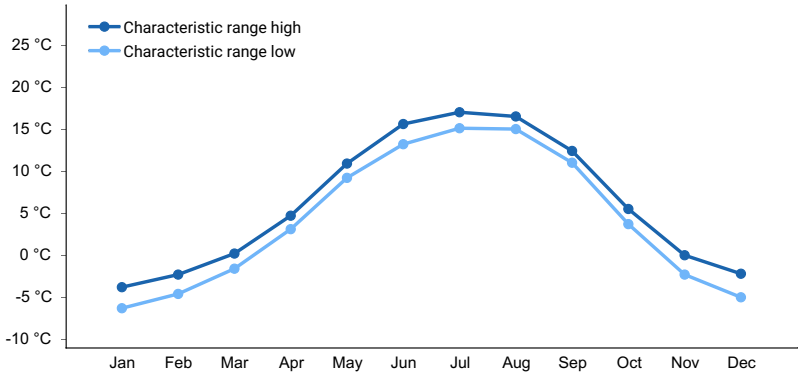

Figure 3. Monthly maximum temperature range

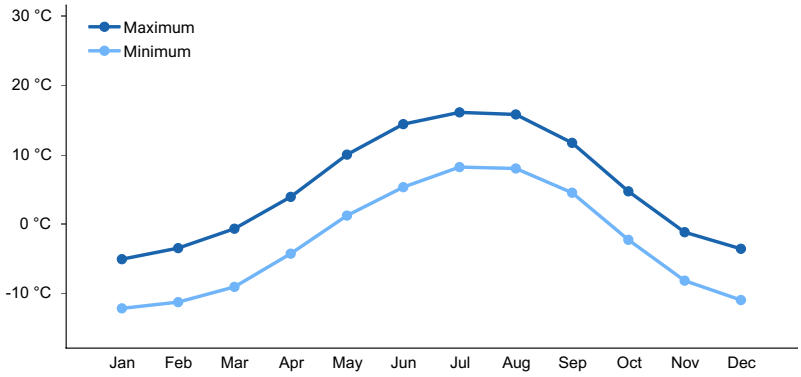

Figure 4. Monthly average minimum and maximum temperature

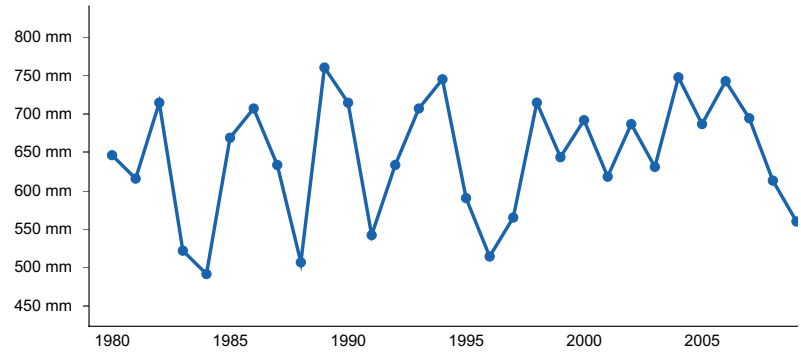

Figure 5. Annual precipitation pattern

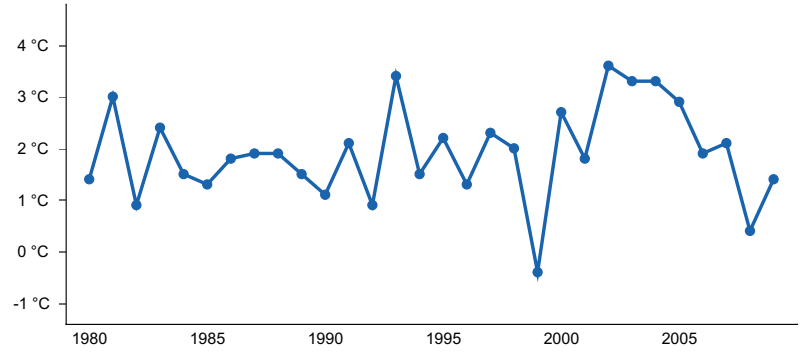

Figure 6. Annual average temperature pattern

Influencing water features

Due to its landscape position, this site is not influenced by wetland or riparian water features. Precipitation is the main source of water.

Soil features

Soils are young and weakly developed Inceptisols (Soil Survey Staff, 2013). Soils are deep and well drained. They support a cryic temperature regime and an udic moisture regime. Parent material is primarily composed of residuum, with colluvium present on steeper slopes.

Soil characteristics affecting vegetation include minimal soil development and high volume rock fragments in the soil. An ochric epipedon and cambic horizon illustrate low levels of soil development on this site. Available soil nutrients are relatively low in the rocky soil. These conditions restrict vegetation on this site to slow growing shrubs and fast-growing herbaceous species that can take advantage of pockets of organic material.

Correlated soil components in MLRA 236: Sharp; D36-Western maritime dwarf scrub residual slopes

Table 5. Representative soil features

Parent material	(1) Residuum
Surface texture	(1) Highly organic silt loam (2) Silt loam
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	64–170 cm
Soil depth	64–170 cm
Surface fragment cover <=3"	2%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	4.83–6.35 cm
Soil reaction (1:1 water) (0-25.4cm)	4.4–5.8
Subsurface fragment volume <=3" (Depth not specified)	30–31%
Subsurface fragment volume >3" (Depth not specified)	25–30%

Table 6. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	64–170 cm
Soil depth	64–170 cm
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	2.29–6.35 cm
Soil reaction (1:1 water) (0-25.4cm)	4.4–5.8
Subsurface fragment volume <=3" (Depth not specified)	30–31%
Subsurface fragment volume >3" (Depth not specified)	25–30%

Ecological dynamics

This site is on alpine convex hill and mountain shoulders and summits. Local site factors such as elevation, soil characteristics, and exposure support one vegetative community. The reference plant community is a ericaceous dwarf scrubland (Viereck et al., 1992).

Site and soil conditions support one community. Cooler temperatures and a shorter growing season support slow-growing, often evergreen shrubs. Wind exposure limits plant height with most shrubs prostrate. Soils are weakly developed and rocky. However, they are deep to a root-restrictive lithic bedrock layer. A shallower soil may not support ericaceous shrubs. Areas without soil development support a mix of surface rock fragments and crustose and foliose lichens.

There is no recognized disturbance on this site. Wind scouring and erosion shape the vegetation in the reference plant community and do not result in a unique, post-disturbance community. There is no known grazing or browsing.

The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities

1.1. Black crowberry-alpine azalea

State 1
Reference State

The reference state supports one community phase, which is distinguished by the developed structure and dominance of the vegetation and the ecological function and stability of the community. The reference community phase is ericaceous dwarf scrubland. The presence of each community is dictated temporally by wind erosion. This report provides baseline inventory data on the vegetation. Future data collection is needed to provide further information about existing plant communities and the disturbance regimes that result in transitions from one community to another. Common and scientific names are from the USDA PLANTS database. The community phase is characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1
Black crowberry-alpine azalea

Figure 7. Typical area of community 1.1.

Community Phase 1.1 Canopy Cover Table

Vegetation data is aggregated across modal sample plots for this community phase and is provided as 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)
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	100	10
S	Black crowberry	*Empetrum nigrum*	EMNI	95	25
S	Alpine azalea	*Loiseleuria procumbens*	LOPR	95	7
S	Lingonberry	*Vaccinium vitis-idaea*	VAVI	95	5
S	Dwarf birch	*Betula nana*	BENA	90	7
S	Marsh Labrador tea	*Ledum palustre* ssp. *decumbens*	LEPAD	90	8
S	Alpine bearberry	*Arctostaphylos alpina*	ARAL2	79	4
S	Arctic willow	*Salix arctica*	SAAR27	58	4
G	Bering Sea sedge	*Carex microchaeta* ssp. *nesophila*	CAMIN	53	7
L	Lichens^	Various species	2LICHN	100	45

^ Lichens are grouped together; they are not sorted by species.

Sample plots are distributed across the survey 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 is rounded, except trace (0.1 percent) cover. Data ranging from 1 to 9 percent cover is rounded to the nearest integer. Data ranging from 10 to 100 percent cover is rounded to the nearest factor of 5.

Figure 8. Frequency and canopy cover of plants in community 1.1.

The reference plant community is ericaceous dwarf scrubland comprised of low-lying shrubs interspersed with lichen. This community consists of low and dwarf shrubs, including black crowberry (*Empetrum nigrum*), dwarf birch (*Betula nana*), bog blueberry (*Vaccinium uliginosum*), alpine azalea (*Loiseleuria procumbens*), alpine bearberry (*Arctostaphylos alpina*), and arctic willow (*Salix arctica*). Hardy graminoids such as Bering Sea sedge (*Carex microchaeta* ssp. nesophila) may be present. Lichens are interspersed among shrubs, including snow lichen (Stereocaulon spp.) and reindeer lichen (Cladonia spp.). Other ground cover generally includes mosses, herbaceous litter, and woody litter. Wind-scoured areas of rock fragments on the surface or bare soil may be present.

Dominant plant species

- black crowberry (*Empetrum nigrum*), shrub
- alpine azalea (*Loiseleuria procumbens*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub

- dwarf birch (*Betula nana*), shrub
- alpine bearberry (*Arctostaphylos alpina*), shrub
- arctic willow (*Salix arctica*), shrub
- Bering Sea sedge (*Carex microchaeta ssp. nesophila*), grass
- Lichen (*Lichen*), other herbaceous

Additional community tables

Inventory data references

Modal points for Community 1.1
07SS01706
08SS28202
08LL06603
09BL11001
09SS14001

References

Viereck, L.A., C. T. Dyrness, A. R. Batten, and K. J. Wenzlick. 1992. The Alaska vegetation classification. U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station General Technical Report PNW-GTR-286..

Other references

Kautz, D.R., P. Taber, and S. Nield, editors. 2012. Land Resource Regions and Major Land Resource Areas of Alaska. United States Department of Agriculture, Natural Resources Conservation Service (USDA–NRCS).

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Approval

Kirt Walstad, 2/13/2024

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	05/13/2025
Approved by	Kirt Walstad
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):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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:**
