USDA Natural Resources Conservation Service

Ecological site R236XY106AK
Subarctic Dwarf Scrub Dry Loamy Slopes

Last updated: 2/13/2024
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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 ecological site is on hill shoulders and lower mountain slopes. Site elevation is typically between 450 and 1,850 feet above sea level. Slopes vary widely, from nearly level to steep.. Wind exposure, slope stability, soil acidity, low soil development/productivity, and andic properties favor the reference community of ericaceous shrubs. There is no determined disturbance regime, though fire may occur under rare, drier conditions.

The reference state supports one community. The reference plant community is characterized as a closed ericaceous scrubland (Viereck et al., 1992). It is composed of a dense mix of low and dwarf shrubs with sporadic graminoids and forbs throughout.

Associated sites

F236XY139AK	**Boreal Woodland Loamy Rises** F236XY139AK describes boreal forests on slopes. It abuts this site on some hill slopes.

R236XY151AK	**Subarctic Open Willow Loamy Plain Swales** R236XY151AK describes swales on hills and plains. It is a relatively smaller landform feature that can be surrounded by R236XY106AK on the landscape.
R236XY105AK	**Subarctic Scrub Mosaic Gravelly Hillslopes** R236Xy105AK describes alder hillslopes. It can be found on the same landscape as this site. Differences in site biotic and abiotic factors differentiate the vegetation between these sites.

Similar sites

R236XY132AK	**Subarctic Dwarf Scrub Dry Loamy Slopes** Both sites support similar shrub and graminoid species in the reference plant community. R236XY132AK is described at higher elevations on mountains where it is subject to grazing pressure and wind exposure. These disturbance pressures are not associated with this site. Soil pH, parent material, and soil hydrology help differentiate these sites.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Empetrum nigrum* (2) *Betula nana*
Herbaceous	(1) *Carex bigelowii* (2) *Calamagrostis canadensis*

Physiographic features

This site is on slopes of hillslope shoulders and lower mountainflanks. Elevation ranges from 450 to 1,820 feet above sea level. Slopes are nearly level to steep (3 – 39 percent). This site is found at all aspects. Flooding and ponding do not affect this site.

Table 2. Representative physiographic features

Hillslope profile	(1) Shoulder
Geomorphic position, mountains	(1) Lower third of mountainflank
Geomorphic position, hills	(1) Crest
Landforms	(1) Mountains > Mountain slope (2) Hills > Hill (3) Plains > Hill
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	450–1,820 ft
Slope	3–39%
Water table depth	60 in
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	290–1,970 ft
Slope	3–40%

Water table depth	60 in

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)	21-34 in
Frost-free period (actual range)	75-100 days
Freeze-free period (actual range)	65-90 days
Precipitation total (actual range)	15-41 in
Frost-free period (average)	90 days
Freeze-free period (average)	75 days
Precipitation total (average)	29 in

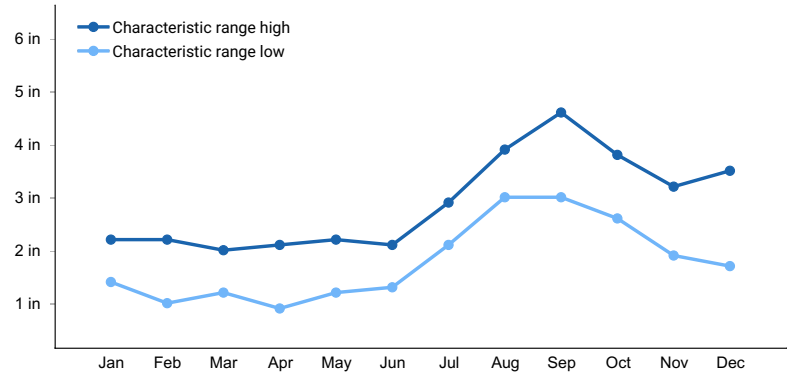

Figure 1. Monthly precipitation range

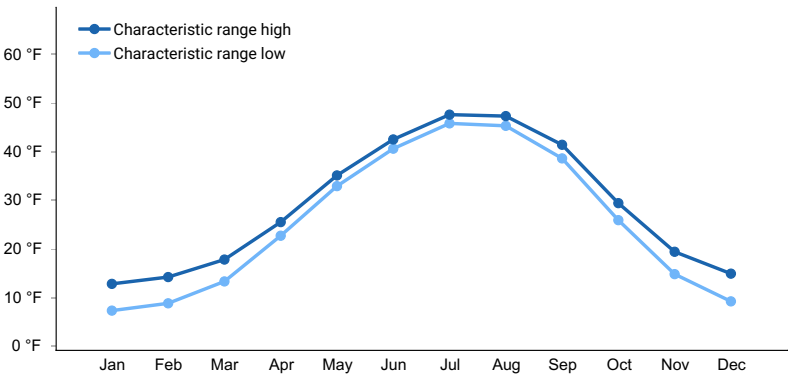

Figure 2. Monthly minimum temperature range

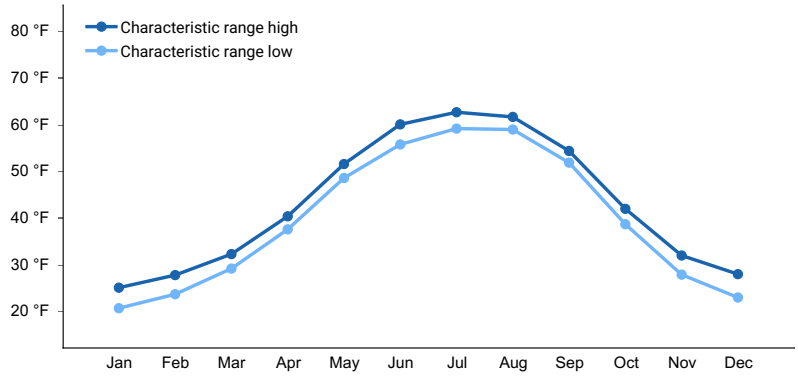

Figure 3. Monthly maximum temperature range

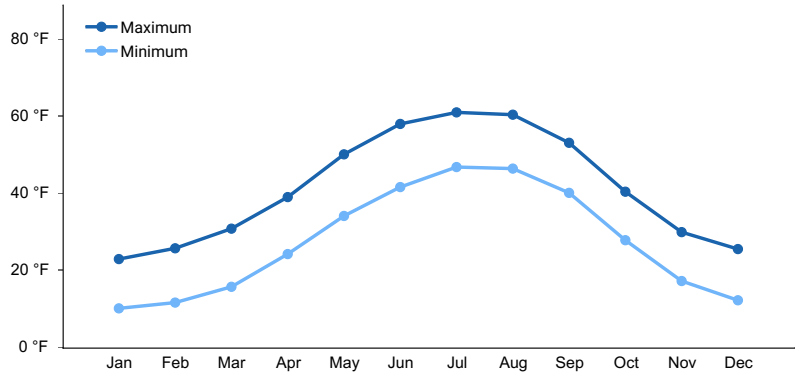

Figure 4. Monthly average minimum and maximum temperature

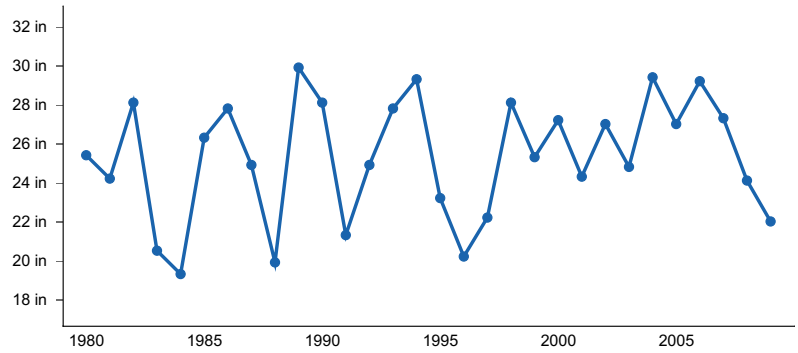

Figure 5. Annual precipitation pattern

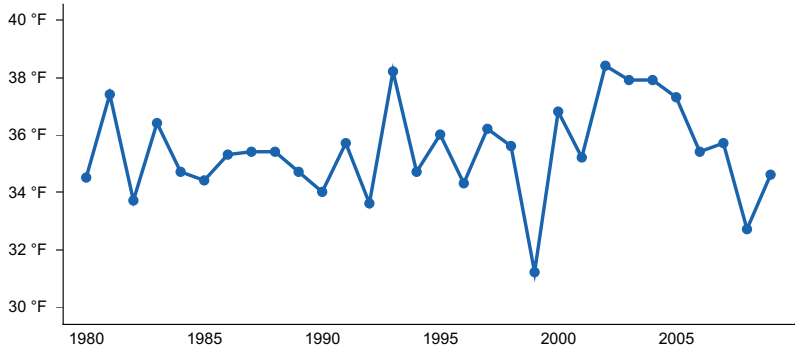

Figure 6. Annual average temperature pattern

Influencing water features

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

Soil features

These Humicryods are extremely to moderately acidic and support a minimally developed ochric epipedon, a leached albic horizon, and contain andic soil properties (Soil Survey Staff, 2013). Soils are very deep and well drained. They support a cryic temperature regime and an udic moisture regime. Parent material is loess over till or volcanic ash over drift.

Soil characteristics affecting vegetation include low soil pH, low soil productivity, and andic soil properties. Strongly to extremely acidic soils restrict vegetation. Soil productivity is low in the ochric epipedon, which also restricts vegetation types and species. Andic soil properties generally have a high water holding capacity, but low available phosphorus for plants (Soil Survey Staff, 2013). In total, these conditions favor the ericaceous shrubs found int eh reference state.

Correlated soil components in MLRA 236: Nishlik, D36-Western maritime low scrub loamy glaciated slopes

Table 5. Representative soil features

Parent material	(1) Till
Surface texture	(1) Highly organic silt loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	2–2.8 in
Soil reaction (1:1 water) (0-10in)	3.7–6.4
Subsurface fragment volume <=3" (Depth not specified)	30%
Subsurface fragment volume >3" (Depth not specified)	3%

Table 6. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Moderate
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	1.3–2.8 in
Soil reaction (1:1 water) (0-10in)	3.7–6.4
Subsurface fragment volume <=3" (Depth not specified)	30%
Subsurface fragment volume >3" (Depth not specified)	3%

Ecological dynamics

This site is on stable hillslope shoulders and lower mountain flanks. It occurs at a wide range of elevations (450 to

1,800 feet above sea level) and slope gradients (nearly level to steep). Exposure on these landforms favors low and dwarf shrubs. Low soil pH and low soil productivity restrict plant life. Moderately to strongly acidic soil selects for plants that thrive in these conditions, particularly the ericaceous shrubs that comprise most of the vegetative cover of this site. Poor soil conditions also shape the plant community. The top six inches of soil support a minimally developed ochric epipedon and andic soil properties between six and eleven inches restricts available phosphorus (Soil Survey Staff, 2013). Soil is well drained but andic soil properties increase the available water capacity on this site, so vegetation is typically not hydrologically restricted.

This site is stable and there is no evidence of a unique post-disturbance community. It may be susceptible to fire under rare, drier conditions. Shrubs and willows may be browsed by moose or caribou. This does not appear to affect the ecological processes of the site.

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-dwarf birch

State 1
Reference State

The reference state supports one community phase, which is distinguished by the developed structure and dominance of the vegetation and by its ecological function and stability. The reference community phase is dense scrubland. No known disturbance regime is associated with this site. This report provides baseline inventory data for the vegetation in this ecological site. 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. Community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1
Black crowberry-dwarf birch

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	Black crowberry	*Empetrum nigrum*	EMNI	100	55
S	Dwarf birch	*Betula nana*	BENA	100	40
S	Marsh Labrador tea	*Ledum palustre* ssp. *decumbens*	LEPAD	100	20
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	100	20
S	Lingonberry	*Vaccinium vitis-idaea*	VAVI	80	10
S	Tealeaf willow	*Salix pulchra*	SAPU15	80	3
S	Beauverd spirea	*Spiraea stevenii*	SPST3	60	10
G	Bluejoint	*Calamagrostis canadensis*	CACA4	80	1

The 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 closed low scrubland (Viereck et al., 1992). It consists of black crowberry (*Empetrum nigrum*),dwarf birch (*Betula nana*), marsh Labrador tea (*Ledum palustre* ssp. decumbens), and bog blueberry (*Vaccinium uliginosum*). Other species may include spirea (*Spiraea stevenii*), lingonberry (*Vaccinium vitis-idaea*), tealeaf willow (*Salix pulchra*), bluejoint (*Calamagrostis canadensis*), and sedges (Carex spp.). Black spruce (*Picea mariana*) may encroach this site where it abuts neighboring boreal MLRA boundaries. Various mosses and lichens are in the ground cover. Other ground cover includes herbaceous and woody litter.

Dominant plant species

- black crowberry (*Empetrum nigrum*), shrub
- dwarf birch (*Betula nana*), shrub
- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub

- tealeaf willow (*Salix pulchra*), shrub
- beauverd spirea (*Spiraea stevenii*), shrub
- bluejoint (*Calamagrostis canadensis*), grass

Additional community tables

Inventory data references

Modal points for Community 1.1
08SS07801
08AO24204
08LL05807
09SS02201

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..

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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	05/11/2025
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):**

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:**

17. **Perennial plant reproductive capability:**