USDA Natural Resources Conservation Service

Ecological site R236XY130AK
Subarctic Scrub Scrub Tundra Loamy Plains and Hills

Last updated: 2/13/2024
Accessed: 05/16/2024

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): 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).

Classification relationships

Alaska Vegetation Classification:
Open low scrubland (II.C.2 - level III) / Shrub birch-ericaceous shrub bog (II.C.2.d - level IV)
(Viereck et al., 1992)

LandFire BioPhysical Settings Model
Alaska Arctic Scrub Birch-Ericaceous Shrubland – Infrequent Fire- 7616821 (LandFire BpS, 2009)

Ecological site concept

This ecological site is on hill and plain toeslopes, talfs, and rises. Site elevation is roughly between 150 and 1,000 feet above sea level. Slope gradients are nearly level to strong (0 – 13 percent). Site characteristics, soil hydrology, and low soil fertility and acidity shape the vegetation on this landform. This site is on exposed convex slopes, which restricts vegetation to low growing and prostrate shrubs and herbaceous species. A water table at the beginning of the growing season further restricts plant life. Cryoturbation also shapes the reference plant community.

The reference state supports one communities. The reference plant community is characterized as an open ericaceous shrubland (Viereck et al., 1992). It is composed of a mix of ericaceous shrubs with hydrophytic sedges throughout.

Associated sites

F236XY171AK	**Subarctic Woodland Loamy Slopes** Both sites are on plain landscapes. R236XY171 describes boreal plain talfs. The wet soils support a black spruce woodland not found in R236XY130AK.
R236XY140AK	**Subarctic Tussock Tundra Wet Loamy Plains** Both sites are on hill landscapes. R236XY140AK is associated with linear talf positions and it is frequently found near or adjacent to organic depressions and drainageways. The mucky peat, poorly drained soil and minimal slope support an aquic soil moisture regime with frequent ponding and a very shallow water table at the beginning of the growing season. Hydrophytic vegetation defines this site.
R236XY132AK	**Subarctic Dwarf Scrub Dry Loamy Slopes** Both sites are on hill landscapes, though R236XY132AK is more common on glaciated landscapes. R236XY132AK is associated with drier soils with a thinner organic horizon and greater subsurface rock fragments.

Similar sites

R236XY132AK	**Subarctic Dwarf Scrub Dry Loamy Slopes** Both sites are on hill and plain landscapes and support common ericaceous shrub species and sedges. However, community composition between these sites differs, as does species richness. Vegetative differences are driven by differences in slope position (shoulders versus toeslopes) and soil characteristics.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ledum palustre subsp. decumbens* (2) *Vaccinium uliginosum*
Herbaceous	(1) *Carex bigelowii* (2) *Carex stylosa*

Physiographic features

This site is on linear and convex slopes of upland hills and plains. Elevation commonly ranges from approximately 150 to 1,000 feet above sea level. Slope gradient is typically nearly level to strong (0 – 13 percent). A water table is present between 15 and 53 inches during peak snow melt at the beginning of the growing season (June). This site is found at all aspects. Ponding and flooding are absent.

Table 2. Representative physiographic features

Geomorphic position, flats	(1) Talf (2) Rise
Geomorphic position, hills	(1) Base Slope
Hillslope profile	(1) Toeslope
Slope shape across	(1) Linear (2) Convex
Slope shape up-down	(1) Linear (2) Convex
Landforms	(1) Hills > Hill (2) Plains > Plain
Runoff class	Low to medium

Flooding frequency	None
Ponding frequency	None
Elevation	49–299 m
Slope	0–13%
Water table depth	38–135 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	0–625 m
Slope	0–43%
Water table depth	0–152 cm

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

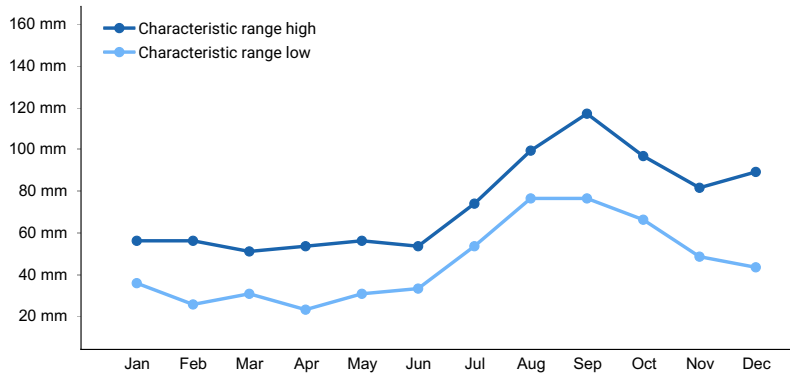

Figure 1. Monthly precipitation range

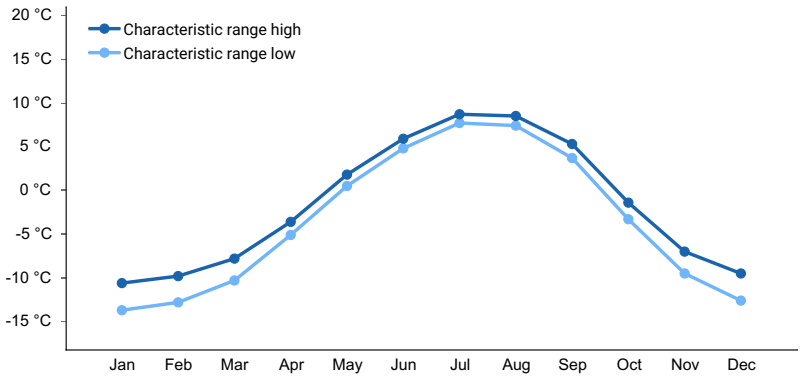

Figure 2. Monthly minimum temperature range

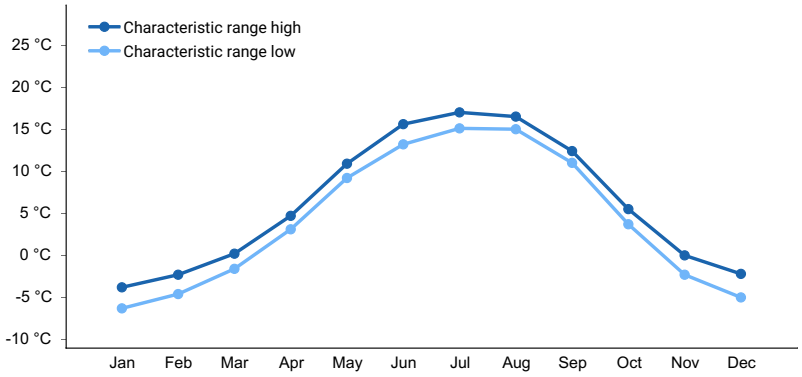

Figure 3. Monthly maximum temperature range

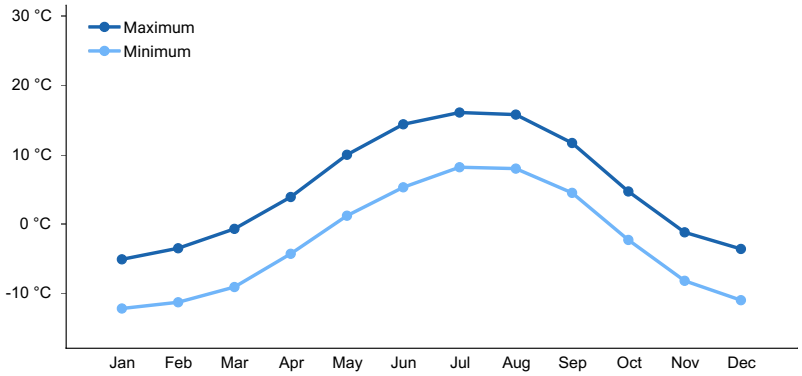

Figure 4. Monthly average minimum and maximum temperature

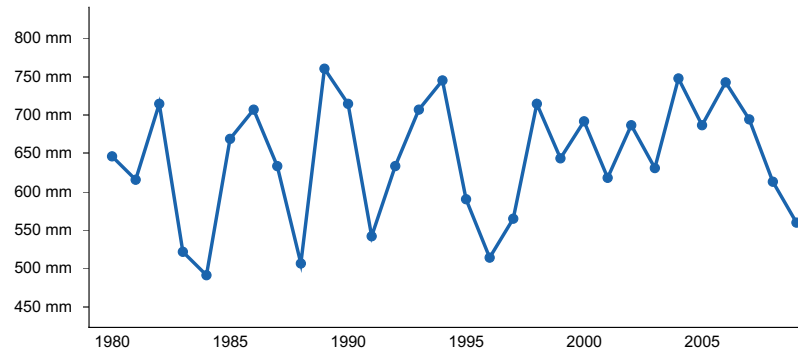

Figure 5. Annual precipitation pattern

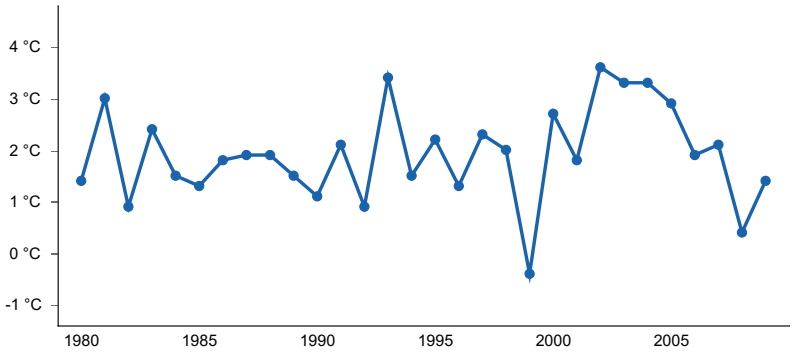

Figure 6. Annual average temperature pattern

Influencing water features

Due to its landscape position, this site is not influenced by wetland or riparian water features. Precipitation and snow melt are the main sources of water. This site contributes water inputs to associated landforms downslope, including plains, drainages and flood plains.

Soil features

Soils are primarily acidic Spodosols with low fertility (Soil Survey Staff, 2013). Soils are very deep and moderately well drained. They support a cryic temperature regime and an udic moisture regime. Parent material is typically mossy organic material over coarse-loamy eolian. Cryoturbation is common.

Soil characteristics affecting vegetation include soil acidity, low soil fertility, and soil hydrology. A water table is present at the soil surface in June and restricts the vegetation that can grow here during the early growing season. A spodic horizon coincides with low pHs and these soils often support heath communities like this site in cool climates. Low soil fertility, partly the result of low pH and andic soil properties that decrease available phosphorus, also shape the plant community.

Correlated soil components in MLRA 236: Cranberrycreek; D36-Western maritime low scrub loamy eolian slopes; D36-Western maritime low scrub loamy eolian slopes, frozen; Egtuk; Klutuk; Terric Cryohemists

Table 5. Representative soil features

Parent material	(1) Eolian deposits (2) Mossy organic material
Surface texture	(1) Highly organic silt (2) Silt loam
Drainage class	Moderately well drained
Permeability class	Moderate
Depth to restrictive layer	Not specified
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	5.33–6.35 cm
Soil reaction (1:1 water) (0-25.4cm)	3.6–5.7
Subsurface fragment volume <=3" (Depth not specified)	0–4%

Subsurface fragment volume >3" (Depth not specified)	0%

Table 6. Representative soil features (actual values)

Drainage class	Poorly drained to well drained
Permeability class	Very slow to moderate
Depth to restrictive layer	66 cm
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	4.06–14.99 cm
Soil reaction (1:1 water) (0-25.4cm)	3.5–5.8
Subsurface fragment volume <=3" (Depth not specified)	0–4%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site is on linear to convex baseslopes, talfs, and rises of upland hills and plains. Lacking a regular natural disturbance, soil characteristics and site hydrology are responsible for the one stable vegetative community on this site. The reference plant community is an open ericaceous scrubland (Viereck et al., 1992).

This site is stable and no post-disturbance community is noted. Fire may occur, though the natural fire interval is much longer (greater than 500 years) than the human management scale. A post-fire community may be comprised of more herbaceous and graminoid species, but will likely return to the reference plant community within 25 years (Landfire, 2009).

Slight to moderate browsing of willows by moose and of lichen by caribou may occur. 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. Marsh Labrador tea-dwarf birch/Bigelow's sedge

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 stable scrubland, which is likely due to the relatively stable landforms and lack of a disturbance regime. 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 would 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
Marsh Labrador tea-dwarf birch/Bigelow's sedge

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	Marsh Labrador tea	*Ledum palustre* ssp. *decumbens*	LEPAD	98	25
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	97	20
S	Dwarf birch	*Betula nana*	BENA	97	20
S	Black crowberry	*Empetrum nigrum*	EMNI	96	25
S	Lingonberry	*Vaccinium vitis-idaea*	VAVI	96	7
S	Alpine bearberry	*Arctostaphylos alpina*	ARAL2	46	1
G	Bigelow's sedge	*Carex bigelowii*	CABI5	54	10
G	Variegated sedge	*Carex stylosa*	CAST10	37	5

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). This community consists of marsh Labrador tea (*Ledum palustre* ssp. decumbens), dwarf birch (*Betula nana*), bog blueberry (*Vaccinium uliginosum*), lingonberry (*Vaccinium vitis-idaea*), and black crowberry (*Empetrum nigrum*). Other species may include Bigelow's sedge (*Carex bigelowii*), variegated sedge (*Carex stylosa*), bluejoint (*Calamagrostis canadensis*), and alpine bearberry (*Arctostaphylos alpina*). White spruce (*Picea glauca*) individuals or groupings are rare. Lichens are

throughout, particularly reindeer lichen (Cladina spp.) and cup lichen (Cladonia spp.). Other common lichen species include star reindeer lichen (*Cladina stellaris*), reindeer lichen (*Cladina stygia*, *Cladina mitis*, and *Cladina arbuscula*), greygreen reindeer lichen (*Cladina rangiferina*), and snow lichen (Stereocaulon spp.). The ground cover also includes mosses, herbaceous litter, and woody litter. Some areas are bare soil.

Dominant plant species

- marsh Labrador tea (*Ledum palustre ssp. decumbens*), shrub
- bog blueberry (*Vaccinium uliginosum*), shrub
- dwarf birch (*Betula nana*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- lingonberry (*Vaccinium vitis-idaea*), shrub
- alpine bearberry (*Arctostaphylos alpina*), shrub
- Bigelow's sedge (*Carex bigelowii*), grass
- variegated sedge (*Carex stylosa*), grass

Additional community tables

Animal community

Inventory data references

Modal points for Community 1.1
09SS04101
09SS05104
09SC00205
10SS05502
10SS06107
10SS11701
10SS12101
10TD11908
10TD13903
10TD14006

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).

Landfire Biophysical Settings. 2009. Biophysical Setting 7616821 – Alaska Arctic Scrub Birch-Ericaceous Shrubland – Infrequent Fire. In: LANDFIRE Biophysical Setting Model: Map zone 76, [Online]. In: Vegetation Dynamics Models. In: LANDFIRE. Washington, DC: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory; U.S. Geological Survey; Arlington, VA: The Nature Conservancy (Producers). Available: https://www.landfire.gov/national_veg_models_op2.php. Accessed Sept 15, 2022

PRISM Climate Group. (PRISM) Oregon State University. https://prism.oregonstate.edu. Date created October 2018. Accessed 3 Mar 2023.

Scenarios Network for Alaska and Arctic Planning (SNAP). Historical Monthly Temperature – 1km, 1901-2009. http://ckan.snap.uaf.edu/dataset/. Accessed 20 Mar 2023.

Scenarios Network for Alaska and Arctic Planning (SNAP). Historical monthly and derived precipitation products downscaled from CRU TS data via the delta methods – 2km, 1901-2009. http://ckan.snap.uaf.edu/dataset/. Accessed 20 Mar 2023.

Soil Survey Staff. 2013. Simplified Guide to Soil Taxonomy. USDA-Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

US Environmental Protection Agency (EPA). Level III Ecoregions of the Conterminous United States. UP ESP Office of Research and Development. Corvallis, OR. http://edg.epa.gov/. Created 16 Apr 2013. Accessed 20 Mar 2023.

Contributors

Sue Tester
Michael Margo
Steph Schmit
Kendra Moseley
Steff Shoemaker
Jamin Johanson
Phil Barber

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	05/12/2016
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Foliar Cover

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:**