USDA Natural Resources Conservation Service

Ecological site R236XY105AK
Subarctic Scrub Mosaic Gravelly Hillslopes

Last updated: 2/13/2024
Accessed: 05/11/2025

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).

Classification relationships

Alaska Vegetation Classification: Closed tall scrubland (Viereck et al., 1992)

Ecological site concept

This ecological site is on hill and mountain backslopes. Site elevation is between 280 and 3,260 feet above sea level. Slopes gradients are strong to steep (10 – 38 percent). Soil fertility and development are low on these soils, making them ideal for nitrogen-fixing alder. Alder creates a positive feedback loop that continues to favor alder in the overstory while supporting shade-tolerant species in the understory.

Associated sites

R236XY106AK	**Subarctic Dwarf Scrub Dry Loamy Slopes** R236XY106AK is upslope of this site on hills. R236XY104AK describes a closed ericaceous scrubland on hill crests. Soils develop from loess, are extremely acidic and have a spodic horizon. These crests are also susceptible to wind exposure, favoring prostrate shrubs. The vegetation in R236XY105AK is a result of the different site and soil conditions, including weakly developed soils with upwards of 65% soil rock fragments.
R236XY104AK	**Alpine Dwarf Scrub Gravelly Slopes** R236XY104AK is upslope of this site on hills. R236XY104AK describes a dwarf scrubland on hill and mountain summits and shoulders. Soils are rocky with a deep restrictive layer. Wind exposure limits plant species and height.

Similar sites

R236XY124AK	**Subarctic Tall Scrub Loamy Convex Hillslopes** Both sites support dense alder in the reference plant community. R236XY124AK describes an alder and willow community on wetter soils than those of this site. R236XY105AK appears as an alder-spirea mosaic that does not have an herbaceous post-erosion disturbance community.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Alnus viridis subsp. sinuata* (2) *Spiraea stevenii*
Herbaceous	(1) *Dryopteris expansa* (2) *Calamagrostis canadensis*

Physiographic features

This site is on linear to concave hill and mountain backslopes. Elevation ranges from 280 to 3,260 feet. Slopes are strongly sloped to steep (10 - 38 percent). This site is found at all aspects. Flooding and ponding do not occur and there is no water table.

Table 2. Representative physiographic features

Geomorphic position, hills	(1) Side Slope
Landforms	(1) Hills > Hillslope (2) Mountains > Mountain slope
Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	280–3,260 ft
Slope	10–38%
Water table depth	60 in
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	160–3,260 ft
Slope	0–40%

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

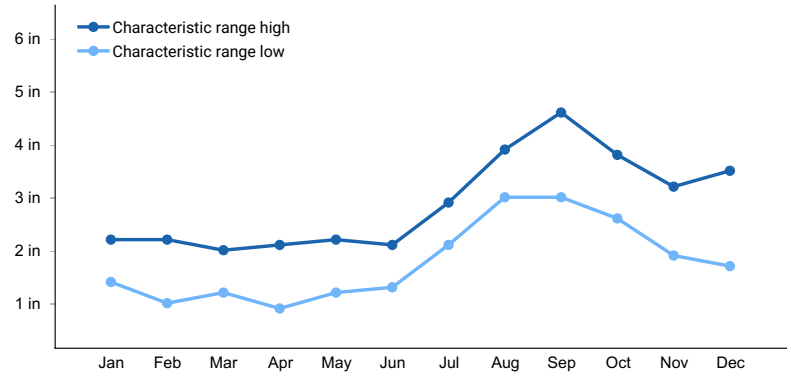


Figure 1. Monthly precipitation range

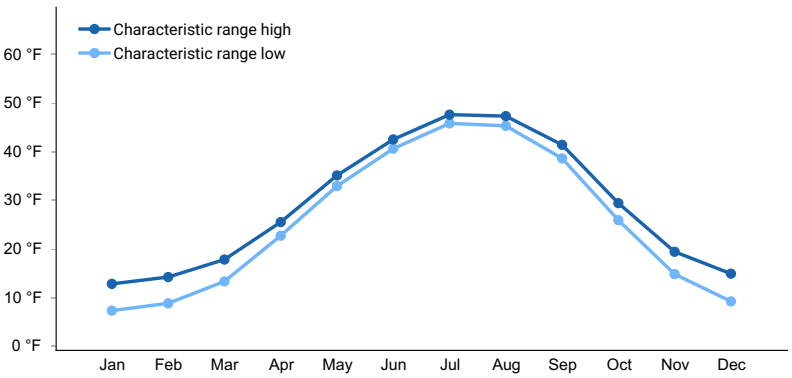


Figure 2. Monthly minimum temperature range

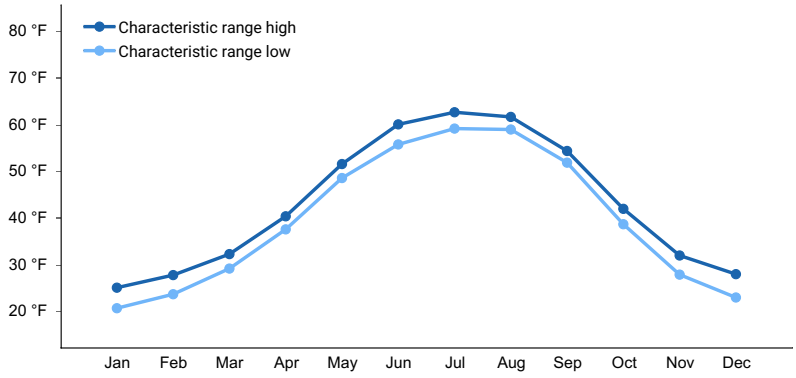


Figure 3. Monthly maximum temperature range

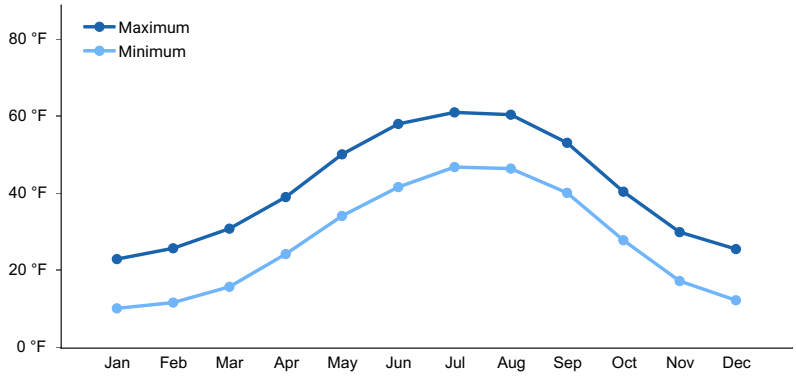


Figure 4. Monthly average minimum and maximum temperature

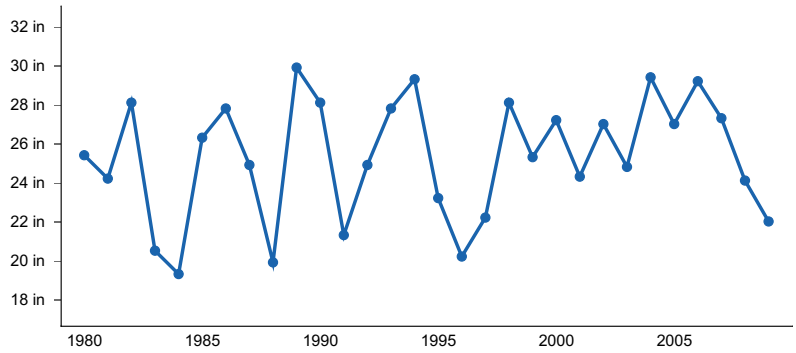


Figure 5. Annual precipitation pattern

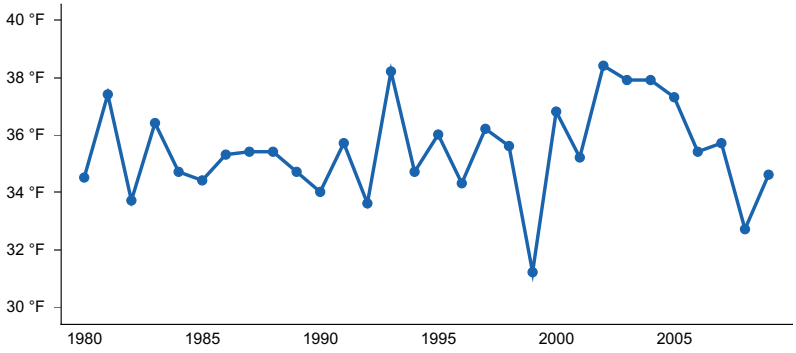


Figure 6. Annual average temperature pattern

Influencing water features

Due to its landscape position, this site is not influenced by wetland or riparian water features. Precipitation and throughflow are the main sources of water. Run off from this site contributes to water inputs at downslope sites.

Soil features

Soils are young and weakly developed Inceptisols (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 colluvium.

Soil development and fertility directly affect vegetation. Soils are weakly developed with a cambic horizon. Rock fragments make up more than 50% of the soil subsurface volume. An umbric epipedon suggests an acidic soil with low to moderate natural fertility (Soil Survey Staff, 2013). Alder is a nitrogen-fixing species that thrives in these soil conditions. Alder roots break up soil and rocks while dropped leaves contribute to the formation of the umbric epipedon.

Correlated soil components in MLRA 236: D36-Western maritime scrub gravelly colluvial slopes; Tikchik

Table 5. Representative soil features

Parent material	(1) Colluvium
Surface texture	(1) Gravelly 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)	2.1–2.6 in
Soil reaction (1:1 water) (0-10in)	4.1–6
Subsurface fragment volume <=3" (Depth not specified)	65%
Subsurface fragment volume >3" (Depth not specified)	0%

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)	1.4–2.6 in
Soil reaction (1:1 water) (0-10in)	4.1–6
Subsurface fragment volume <=3" (Depth not specified)	65%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site is on hill and mountain backslopes. Local site factors including soil development and fertility and slope shape support one plant community. The reference plant community is a dense, tall alder scrubland with patches of open low shrubs, graminoids, and forbs interspersed across the slope. The factors responsible for these non-alder

patches are unknown, but may include natural alder die-back, lingering effects of snowpack, slope erosion, and/or local hydrology.

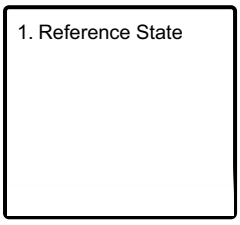
This site is relatively stable. Landslides are rare, though steeper slopes may be susceptible. Disturbed areas are hypothesized to be colonized by alder, quickly transforming the bare, rocky surface back to the reference plant community.

Willows, where they occur, are slightly browsed by moose. This does not appear to affect the ecological processes of the site.

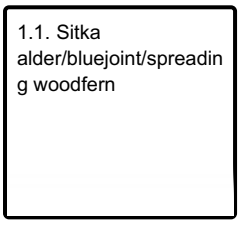
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant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

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference State

The reference state supports one community phase. The reference plant community is characterized by an open tall scrubland comprised of dense alder interspersed with patches of low, open shrubland. These areas appear as a mosaic across the hillslope. All community phases in this report are characterized using the Alaska vegetation classification system (Viereck et al., 1992). 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. Community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Dominant plant species

- Sitka alder (*Alnus viridis ssp. sinuata*), shrub
- beauverd spirea (*Spiraea stevenii*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- spreading woodfern (*Dryopteris expansa*), other herbaceous

Community 1.1
Sitka alder/bluejoint/spreading woodfern

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	Sitka alder	*Alnus viridis* ssp. *sinuata*	ALVIS	100	85
G	Bluejoint	*Calamagrostis Canadensis*	CACA4	80	15
F	Spreading woodfern	*Dryopteris expansa*	DREX2	100	30
F	Arctic starflower	*Trientalis europaea*	TREU	100	2
F	Claspleaf twistedstalk	*Streptopus amplexifolius*	STAM2	80	2
F	Horsetails^	*Equisetum spp.*	EQUIS	30, 20, 20	2, 3, 6

^ Horsetails (*Equisetum spp.*) are represented by three species—*E. arvense, E. pratense,* and *E. sylvaticum,* respectively.

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, tall scrubland with patches of low shrubland throughout (Viereck et al., 1992). This community appears as a mosaic across the hillslopes where it is found. The overstory is dense Sitka alder. Shade-tolerant herbaceous species are most common beneath alder. A low shrubland is supported in areas without alder. Beauverd spirea is the major shrub species here and is complimented with a dense mix of herbaceous species, including fireweed, bluejoint, green false hellebore, and horsetails.

Dominant plant species

- Sitka alder (*Alnus viridis ssp. sinuata*), shrub
- beauverd spirea (*Spiraea stevenii*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- spreading woodfern (*Dryopteris expansa*), other herbaceous

Additional community tables

Inventory data references

Modal points for Community 1.1
08SS08301
08SS08302
08LL06604
09BL10303
09SC00504

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

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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:**