Ecological site R236XY154AK
Subarctic Ericaceous Scrub Loamy Plain Swales

Last updated: 2/13/2024
Accessed: 04/20/2024

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.

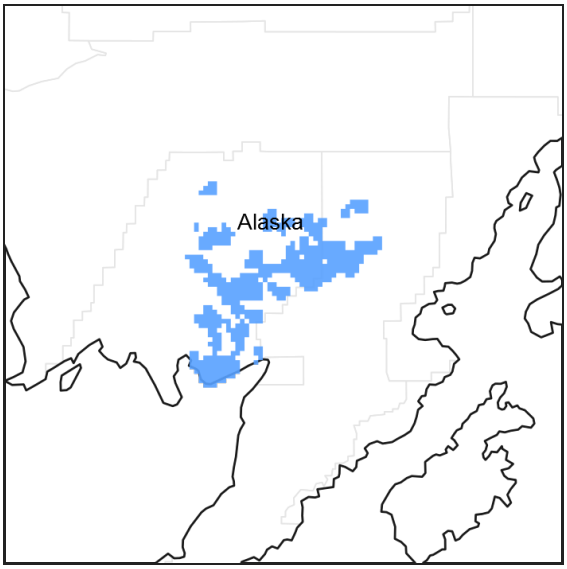


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

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 site is in linear swales on plains and hills. Site elevation is between 170 and 550 feet above sea level. Slopes are nearly level to gentle (0 – 7 percent). Site hydrology and soil acidity shape the vegetation on this landform. Ponding is occasional and brief and a water table is present from October through April between 13 and 31 inches. Soils are well drained and moderately to extremely acidic, which are excellent conditions for low, ericaceous shrubs.

The reference state supports two communities. The reference plant community is characterized as an ericaceous shrubland (Viereck et al., 1992). It is composed of a mix of low and dwarf ericaceous shrubs with patchy graminoids and moss throughout.. Wetter areas within swales typically support more herbaceous species and less shrubs.

Associated sites

R236XY132AK	**Subarctic Dwarf Scrub Dry Loamy Slopes** R236XY132AK describes convex slopes on rolling plains and hills. The vegetation on these slopes strongly clash with the more hydrophytic community associated with the nearby concave swales described by R236XY154AK.
R236XY174AK	**Subarctic Mosaic Loamy Steep Bluffs** R236XY174AK describes steeply sloped bluffs. Though spatially close, the vegetation and other ecological dynamics of a bluff are very different from that of concave swales.

Similar sites

R236XY151AK	**Subarctic Open Willow Loamy Plain Swales** Both sites are in swales. R236XY151AK describes circular swales. Vegetation at both sites is influenced by site hydrology. Ponding occurs in circular swales but not in the swales described by R236XY154AK. Differences in site and soil hydrology results in different site vegetation.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Empetrum nigrum* (2) *Vaccinium uliginosum*
Herbaceous	(1) *Calamagrostis canadensis* (2) *Chamerion angustifolium*

Physiographic features

This site is on linear swales on plains and hills. Elevation ranges from 170 to 550 feet above sea level. Slopes are nearly level to gentle (0 – 7 percent). This site is found at all aspects. Ponding is occasional and brief and a water table is present from October through April between 13 and 31 inches.

Table 2. Representative physiographic features

Slope shape across	(1) Concave
Slope shape up-down	(1) Linear
Landforms	(1) Valley > Plain (2) Valley > Swale
Runoff class	Low to medium
Flooding frequency	None
Ponding duration	Brief (2 to 7 days)

Ponding frequency	Occasional
Elevation	170–550 ft
Slope	0–7%
Water table depth	13–31 in
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 duration	Brief (2 to 7 days)
Ponding frequency	Occasional
Elevation	0–3,260 ft
Slope	0–15%
Water table depth	13–31 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

Influencing water features

Due to its landscape position, this site is not influenced by wetland or riparian water features. Precipitation and slope run-off are the main sources of water.

Soil features

Soils are young and weakly developed Inceptisols (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 organic material over coarse-silty slope alluvium.

Soil characteristics affecting vegetation include hydrology and soil acidity. A water table is present from October through April. Redox concentrations indicate that anoxic conditions are present for part of the year. These conditions select for resilient facultative wetland species, particularly in community 1.2. Soil acidity ranges from moderately to extremely acidic. Certain plants, such as ericaceous shrubs, thrive in low pH soil and explains their presence in the reference plant community.

Correlated soil components in MLRA 236: D36-Western maritime low scrub loamy swales

Table 5. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Highly organic silt
Drainage class	Moderately well drained
Permeability class	Moderate
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	2.4–2.8 in
Soil reaction (1:1 water) (0-10in)	3.8–5.8
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 6. Representative soil features (actual values)

Drainage class	Moderately well drained
Permeability class	Moderate
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	2.4–2.8 in
Soil reaction (1:1 water) (0-10in)	3.8–5.8
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site is on linear, concave swales of upland plains and hills. Local site factors including site hydrology and soil characteristics support two vegetative communities. The reference plant community is an open dwarf ericaceous scrubland (Viereck et al., 1992). This community develops on the acidic, minimally developed soil of this site.

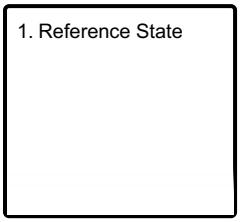
Linear swales do not develop the wetland reference plant community that is seen in circular swales. Ponding is occasional and brief. Linear swales are open systems that do not impede overflow, nor does the moderately well drained soil impede through flow. Additionally, the water table does not extend through the growing season (October through April). These conditions, along with the acidic soil, are ideal for an ericaceous scrubland.

Differences in soil and site hydrology within and between linear swales can result in a hydrophytic herbaceous community. Wet conditions develop in areas where water input rates during the growing season match or outpace over- and through flow rates. These areas support less shrubs and more hydrophytic graminoids and forbs. Simultaneously, higher pH levels due to increased water hinders ericaceous growth and reproduction.

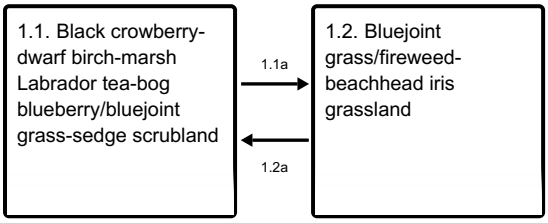
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant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

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - Increased hyrologic effects

1.2a - Decreased hydrologic effects

State 1
Reference State

The reference state supports two community phases, which are grouped by the structure and dominance of the vegetation (e.g., shrubs, graminoids, and forbs) and by their ecological function and stability. The presence of these communities is dictated temporally by overland runoff. The reference community phase is characterized by scrubland that consists of various low and dwarf shrubs and graminoids throughout. No alternate states have been observed.

Community 1.1
Black crowberry-dwarf birch-marsh Labrador tea-bog blueberry/bluejoint grass-sedge scrubland

Figure 8. Typical area of community 1.1.

Community Phase Canopy Cover

(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
S	Black crowberry	*Empetrum nigrum*	EMNI	100	30
S	Dwarf birch	*Betula nana*	BENA	100	10
S	Marsh Labrador tea	*Ledum palustre* ssp. *decumbens*	LEPAD	100	10
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	92	20
S	Beauverd spirea	*Spiraea stevenii*	SPST3	83	5
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	92	25
F	Fireweed	*Chamerion angustifolium*	CHAN9	58	4

Figure 9. Constancy and canopy cover of plants in community 1.1.

The reference community phase is characterized by scrubland consisting of low and dwarf shrubs with various graminoids throughout. Typically, this community consists of black crowberry (*Empetrum nigrum*), dwarf birch (*Betula nana*), marsh Labrador tea (*Ledum palustre* ssp. decumbens), bog blueberry (*Vaccinium uliginosum*), and bluejoint grass (*Calamagrostis canadensis*). Other species may include lingonberry (*Vaccinium vitis-idaea*), spirea (*Spiraea stevenii*), tealeaf willow (*Salix pulchra*), Altai fescue (*Festuca altaica*), various sedges (Carex spp.), fireweed (*Chamerion angustifolium*), and Canadian burnet (*Sanguisorba canadensis*). Rare individuals or small clusters of stunted or regenerative white spruce (*Picea glauca*) trees are present. Mosses, including feathermosses and sphagnum mosses (Sphagnum spp.), commonly are in the ground cover (about 30 percent total mean cover). Lichens typically are present (about 10 percent cover), including reindeer lichen (Cladina spp.) and cup lichen (Cladonia spp.). The ground cover is dominantly herbaceous litter (about 60 percent cover). About 1 percent is bare soil.

Community 1.2
Bluejoint grass/fireweed-beachhead iris grassland

Figure 10. Typical area of community 1.2.

Community Phase Canopy Cover

(Vegetation data in the table are provided as constancy (percent) and average canopy cover (percent) of the most dominant and ecologically relevant species for this community phase.)

Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
S	Beauverd spirea	*Spiraea stevenii*	SPST3	83	5
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	50	10
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	55
F	Fireweed	*Chamerion angustifolium*	CHAN9	83	4
F	Beachhead iris	*Iris setosa*	IRSE	67	10
F	Seacoast angelica	*Angelica lucida*	ANLU	67	2

Figure 11. Constancy and canopy cover of plants in community 1.2.

The early runoff community phase is characterized by grassland that has various forbs and sporadic shrubs throughout. Typically, this community consists of bluejoint grass (*Calamagrostis canadensis*) and clusters of fireweed (*Chamerion angustifolium*), seacoast angelica (*Angelica lucida*), beachhead iris (*Iris setosa*), and spirea (*Spiraea stevenii*). Other species include sedges (Carex spp.), bog blueberry (*Vaccinium uliginosum*), arctic raspberry (*Rubus arcticus*), field horsetail (*Equisetum arvense*), and arctic starflower (*Trientalis europaea*). Mosses generally are in the ground cover (about 25 percent total mean cover), including sphagnum moss (Sphagnum spp.) and polytrichum moss (Polytrichum spp.). Other ground cover includes herbaceous litter (about 80 percent cover) and woody litter (about 2 percent).

Pathway 1.1a
Community 1.1 to 1.2

Black crowberry-dwarf birch-marsh Labrador tea-bog blueberry/bluejoint grass-sedge scrubland

Bluejoint grass/fireweed-beachhead iris grassland

Increased hydrologic effects that create wetter conditions in a swale can cause a vegetative shift. Increases in water input during the growing season, from increased precipitation or run off, can cause less hydrophytic species to die back, making space for fast growing facultative wetland species to colonize.

Pathway 1.2a
Community 1.2 to 1.1

Bluejoint grass/fireweed-beachhead iris grassland

Black crowberry-dwarf birch-marsh Labrador tea-bog blueberry/bluejoint grass-sedge scrubland

A decrease in area wetness allows less hydrophytic species to colonize and a develop an ericaceous shrubland. Decreased wetness can result from a decrease in precipitation or run-off at a site or via improved site drainage. Nearby hill slopes and plain talfs are a ready ericaceous seed source and propagule pressure is high.

Additional community tables

Inventory data references

Modal points for Community 1.1
07SS12603
10SS08904
10SS13402
10SS14107

Modal points for community 1.2
17SS00901
09SS14002
10SS13904

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).

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.

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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	04/20/2024
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:

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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:**
