USDA Natural Resources
Conservation Service

Ecological site R236XY175AK
Subarctic Scrub Loamy Steep Coastal Bluffs

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.

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 ecological site is on coastal bluffs. Site elevation is between 10 and 150 feet above sea level. Slopes are steep to very steep (40 – 70 percent). Soil hydrology and lack of development, slope gradient and a erosion disturbance regime shape the vegetation on this landform.

The reference state supports two communities. The reference plant community is characterized as a closed, tall scrubland (Viereck et al., 1992). It is composed of a mix of alder and willow in the overstory with bluejoint and fern in the understory. Landslides and slope sloughing result in bare ground. Fast growing graminoid and herbaceous species colonize these sites and create a mixed meadow (community 1.2)

Associated sites

R236XY124AK	**Subarctic Tall Scrub Loamy Convex Hillslopes** R236XY124AK describes convex slopes on coastal hills and plains. These landforms are terminated along the coast by the bluffs described by R236XY175AK.
R236XY136AK	**Subarctic Low Scrub Loamy Plain Drainages** F236XY136AK described drainageways on coastal plains. These drainageways bisects the bluffs described by R1236XY175AK.

Similar sites

R236XY174AK	**Subarctic Mosaic Loamy Steep Bluffs** Both sites describe steep landforms subject to erosion. R236XY174AK is found in drainages and along river escarpments. Site characteristics, including climate and erosional pressures, are different between those locations and the coastal bluffs described by R236XY175AK.

Table 1. Dominant plant species

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

Physiographic features

This site is on coastal bluffs. Elevation ranges from 10 to 150 feet above sea level. Slopes are steep to very steep (40 to 70 percent). This site is found at all aspects. Flooding and ponding do not occur. A shallow water table (8 to 17 inches) is present in June.

Table 2. Representative physiographic features

Slope shape up-down	(1) Linear (2) Convex
Slope shape across	(1) Linear
Landforms	(1) Lowland > Bluff
Runoff class	High
Flooding frequency	None
Ponding frequency	None
Elevation	10–150 ft

Slope	40–70%
Water table depth	8–17 in
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	High
Flooding frequency	None
Ponding frequency	None
Elevation	0–150 ft
Slope	40–70%
Water table depth	8–17 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 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 poorly drained. They support a cryic temperature regime and an aquic moisture regime. Parent material is organic material over coarse-silty colluvium over gravelly till.

Soil characteristics affecting vegetation include soil hydrology and lack of development. This poorly drained soil supports a water table in June and aquic conditions between 8 and 72 inches. Soil wetness is reflected in the plant community, which is comprised of facultative and facultative wet wetland species. Only the steep slopes (40 – 70 percent) prevent this soil from supporting obligate wetland species. The steep slope, subject to erosion, combined with weakly developed soil, as evidenced by an ochric epipedon, are the ideal site conditions for an alder community.

Correlated soil components in MLRA 236: Flounder

Table 5. Representative soil features

Parent material	(1) Till
Surface texture	(1) Highly organic silt loam
Drainage class	Poorly drained
Permeability class	Moderate
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	2.2–2.6 in
Soil reaction (1:1 water) (0-10in)	4.1–5.1
Subsurface fragment volume <=3" (Depth not specified)	25%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 6. Representative soil features (actual values)

Drainage class	Poorly drained
Permeability class	Moderate
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	2.2–2.6 in
Soil reaction (1:1 water) (0-10in)	4.1–5.1
Subsurface fragment volume <=3" (Depth not specified)	25%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site is on coastal escarpments. Local site factors, including slope steepness, minimally developed, aquic soil and an erosion disturbance support two communities on this site. The reference plant community is a tall, closed scrubland (Viereck et al., 1992). The mix of weakly developed, rocky soil along with aquic soil conditions results in a mixed canopy of alder and willow.

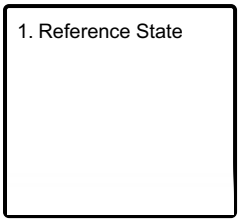
Erosion is responsible for a unique post-disturbance community. Landslides and slope sloughing result in bare ground. Fast growing graminoid and herbaceous species colonize these sites and create a mixed meadow.

Willows are slightly browsed by moose. This does not affect the ecological processes of the site.

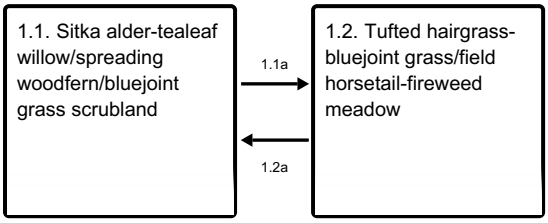
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant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

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1a - Erosion.

1.2a - Erosion recovery.

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 erosion. The reference community phase is Characterized by dense scrubland consisting of medium and tall shrubs and a species-poor understory. No alternate states have been identified.

Community 1.1
Sitka alder-tealeaf willow/spreading woodfern/bluejoint grass 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	Sitka alder	*Alnus viridis* ssp. *sinuata*	ALVIS	100	70
S	Tealeaf willow	*Salix pulchra*	SAPU15	67	25
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	8
F	Spreading woodfern	*Dryopteris expansa*	DREX2	100	60

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

The reference community phase is characterized by dense scrubland consisting of medium and tall shrubs and an understory of ferns and grasses. Typically, this community consists of dense Sitka alder (*Alnus viridis* ssp. sinuata) and an understory of spreading woodfern (*Dryopteris expansa*) and bluejoint grass (*Calamagrostis canadensis*). Other species may include tealeaf willow (*Salix pulchra*), feltleaf willow (*Salix alaxensis*), long beechfern (*Phegopteris connectilis*), and horsetails (Equisetum spp.). Mosses typically are low in density (1 percent total mean cover), and lichens generally are not present. The ground cover is dominantly herbaceous litter (about 95 percent cover), but it may include woody litter (about 2 percent). About 1 percent is bare soil. Note: The vegetation and soils for this community were sampled at three locations. Due to the limited data available, personal field observations were used to aid in describing the plant community.

Community 1.2
Tufted hairgrass-bluejoint grass/field horsetail-fireweed meadow

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)
G	Tufted hairgrass	*Deschampsia cespitosa*	DECE	100	70
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	5
F	Field horsetail	*Equisetum arvense*	EQAR	100	25
F	Fireweed	*Chamerion angustifolium*	CHAN9	100	5
F	Spreading woodfern	*Dryopteris expansa*	DREX2	100	2

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

The early erosional community phase is characterized by a meadow of dominantly grasses and forbs. Typically, this community consists of tufted hairgrass (*Deschampsia cespitosa*), bluejoint grass (*Calamagrostis canadensis*), field horsetail (*Equisetum arvense*), fireweed (*Chamerion angustifolium*), and spreading woodfern (*Dryopteris expansa*). Other species may also be present, including common ladyfern (*Athyrium filix-femina*), arctic starflower (*Trientalis europaea*), woodland horsetail (*Equisetum sylvaticum*), and others. Mosses and lichens are rare in these recently disturbed areas. The ground cover is dominantly herbaceous litter. Some areas of bare soil and surface rock fragments may also be present. Note: The vegetation and soils for this community were sampled at one location. Due to the limited data available for this community phase, personal field observations were used to aid in describing this community.

Pathway 1.1a
Community 1.1 to 1.2

Sitka alder-tealeaf willow/spreading woodfern/bluejoint grass scrubland

Tufted hairgrass-bluejoint grass/field horsetail-fireweed meadow

Erosion. Water erosion, wind erosion, and landslides are common on these steep escarpments. These disturbances may remove all vegetation and diminish the existing seed bank, creating a nonvegetated area of herbaceous and woody litter, rock fragments, and bare soil. Due to the lack of competition for light and space, these areas are ideal for growth of wind-dispersed pioneer plants. This transition is expected to begin immediately after a major erosional event.

Pathway 1.2a
Community 1.2 to 1.1

Tufted hairgrass-bluejoint grass/field horsetail-fireweed meadow

Sitka alder-tealeaf willow/spreading woodfern/bluejoint grass scrubland

Natural succession: Time and growth without disruptive erosion. Over time, shrubs such as willows and nitrogen-fixing alder may colonize. Eventually, the understory will consist of shade-tolerant forbs and graminoids. The period needed for this transition is unknown. It likely at least partially depends on the distance to seed sources and the rates of colonization, growth, and reproduction of plants.

Additional community tables

Inventory data references

Modal points for Community 1.1
07CS15705
07CS16203
07CS17107

Modal points for community 1.2
10SS02007

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:

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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:**
