USDA Natural Resources
Conservation Service

Ecological site R236XY170AK
Subarctic Graminoid Loamy Coastal Plain Rises

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 lowland ecological site is on rises of coastal plains. Site elevation is between sea level and 50 feet. Slopes are nearly level (0 – 3 percent). Soil development, acidity, salt spray and a flooding regime shape the vegetation on this landform. Soils are young and acidic with low nutrient levels and low available water capacity. Coastal flooding of brackish water and salt spray further restrict vegetation. Lower areas are often scoured by flooding events creating concave areas where hydrophytic vegetation is selected for.

The reference state supports two communities. The reference plant community is characterized as a herbaceous graminoid grassland (Viereck et al., 1992). It is composed of salt-tolerant grasses and forbs common to coastal beaches in southwest Alaska.

Associated sites

R236XY129AK	**Subarctic Low Scrub Peat Coastal Plains** R236XY129AK is a scrubland site on coastal plains. Site hydrology, including differences in flooding and ponding disturbances, does not influence the vegetation here as much as it does in R236XY170AK.

Similar sites

R236XY133AK	**Subarctic Graminoid Loamy Tidal Coastal Plains** Both sites are graminoid communities on the coastal plain. R236XY133AK is associated with very poorly drained soils susceptible to coastal flooding and ponding. Hydrologic pressure creates a community comprised primarily of facultative wet to obligate wetland species. While both sites feature a graminoid meadow, the plants and underlying ecological processes are different in these sites.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Calamagrostis canadensis* (2) *Leymus mollis*

Physiographic features

This site is on linear rises on coastal plains. Elevation ranges from sea level to 50 feet. Slopes are nearly level (0 – 3 percent). This site is found at all aspects. Flooding is rare.

Table 2. Representative physiographic features

Geomorphic position, flats	(1) Rise (2) Talf
Landforms	(1) Coastal plain > Coastal plain
Runoff class	Negligible to low
Flooding frequency	Rare
Ponding frequency	None
Elevation	0–15 m
Slope	0–3%
Water table depth	Not specified
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to low
Flooding frequency	Rare
Ponding frequency	None
Elevation	0–15 m
Slope	Not specified
Water table depth	0 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

Influencing water features

This site is susceptible to coastal flooding. Inundation by salt or brackish water influences the vegetation on this site by excluding plants unable to handle the hydrologic and chemical stresses of salt water inundation.

Soil features

Soil is a young Entisols with little to no development (Soil Survey Staff, 2013). Soil is very deep and somewhat excessively drained. It supports a cryic temperature regime and an udic moisture regime. Parent material is coarse-loamy eolian deposits over sandy and gravelly fluviomarine deposits.

Soil hydrology, including available water capacity and drainage class, and poor soil development are the major soil factors affecting vegetation. Available water capacity is low in this somewhat excessively drained soil as a result of a high proportion of subsurface fragments (greater than 50% by volume). Slight acidity to slight alkalinity (pH 6.1 to 7.4) and an ochric epipedon point towards a young soil that has not had time to accumulate organic material and nutrients. These conditions, along with inundation by salt spray and coastal flooding, greatly restrict vegetation to fast-growing, salt-tolerant graminoid and forb species common to coastal areas.

Correlated soil components in MRLA 236: Ekuk, Ustiugof

Table 5. Representative soil features

Parent material	(1) Marine deposits
Surface texture	(1) Silt loam

Drainage class	Somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	2.54–3.56 cm
Soil reaction (1:1 water) (0-25.4cm)	6.1–7.4
Subsurface fragment volume <=3" (Depth not specified)	55%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 6. Representative soil features (actual values)

Drainage class	Very poorly drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	2.54–6.1 cm
Soil reaction (1:1 water) (0-25.4cm)	6.1–7.5
Subsurface fragment volume <=3" (Depth not specified)	55–64%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site is on rises of lowland coastal plains. Local site factors including hydrology and coastal flooding support two vegetative communities. The reference plant community is an herbaceous graminoid grassland.

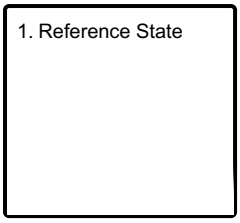
Spatial and temporal patterns in soil and site hydrology create two communities on this site. The reference plant community is comprised of fast growing herbaceous graminoids and forbs. These species thrive in udic soils with low nutrients and are resilient to salt spray. Coastal flooding influences the distribution and abundance of species in disturbed areas (Pollock, Naiman and Hanley, 1998; Pennings and Callaway, 1992). Coastal storms scour vegetation and soil on this site. Powerful storms erode susceptible areas and lower the relative elevation. Aquic soil conditions may develop. Vegetation shifts to a facultative wet to obligates wetland grassland.

Natural browse was not recorded on this site.

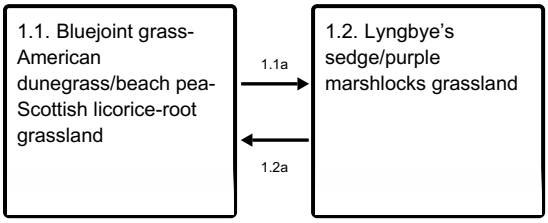
The information in this Ecological Dynamics section, including the state-and-transition model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant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

1.2a - Site stabilization and relative elevation increase

State 1
Reference State

The reference state supports two community phases, which are grouped by the structure and dominance of the vegetation (e.g., graminoids and forbs) and by their ecological function and stability. The presence of these communities is dictated temporally by the occasional or frequent periods of flooding. The reference community phase is represented by grassland with hydrophilic forbs dispersed throughout. No alternate states have been observed.

Community 1.1
Bluejoint grass-American dunegrass/beach pea-Scottish licorice-root grassland

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)
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	100	60
G	American dunegrass	*Leymus mollis*	LEMO8	80	25
G	Arctic bluegrass	*Poa arctica*	POAR2	80	5
F	Scottish licorice-root	*Ligusticum scoticum*	LISC3	100	3
F	Beach pea	*Lathyrus japonicus* var. *maritimus*	LAJAM	60	8

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

The reference community phase is characterized by grassland that has hydrophilic forbs dispersed throughout. Typically, this community consists of dense bluejoint grass (*Calamagrostis canadensis*) and American dunegrass (*Leymus mollis*) with beach pea (*Lathyrus japonicus* var. maritimus) and Scottish licorice-root (*Ligusticum scoticum*) throughout. Other species may include arctic bluegrass (*Poa arctica*), largeflower speargrass (*Poa eminens*), and boreal yarrow (*Achillea millefolium*). Shrubs, trees, and lichens typically are not in this community. The ground cover is dominantly herbaceous litter (about 99 percent cover). Some mosses (about 5 percent cover) may be present.

Community 1.2
Lyngbye's sedge/purple marshlocks 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.)

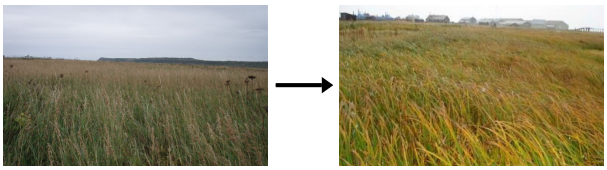
Plant group	Common name	Scientific name	USDA plant code	Constancy (percent)	Average canopy cover (percent)
G	Lyngbye's sedge	*Carex lyngbyei*	CALY3	100	75
G	Mud sedge	*Carex limosa*	CALI7	100	1
F	Purple marshlocks	*Comarum palustre*	COPA28	100	5
F	Threepetal bedstraw	*Galium trifidum* ssp. *trifidum*	GATRT5	100	1

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

The early flooding community phase is characterized by a sedge meadow. Typically, this community consists of dense Lyngbye's sedge (*Carex lyngbyei*) and scattered purple marshlocks (*Comarum palustre*). Other graminoids

such as mud sedge (*Carex limosa*) and reedgrass (Calamagrostis spp.) and forbs such as threepetal bedstraw (*Galium trifidum* ssp. trifidum), Mackenzie's water hemlock (*Cicuta virosa*), and arctic dock (*Rumex arcticus*) may be present. Shrubs and trees generally are not in this community phase. The ground cover is dominantly herbaceous litter, but some mosses may be present. Some areas of the surface may be covered by water. Note: The vegetation and soils for this community were sampled at one location. Due to the limited data available, personal field observations were used to aid in describing the plant community.

Pathway 1.1a
Community 1.1 to 1.2

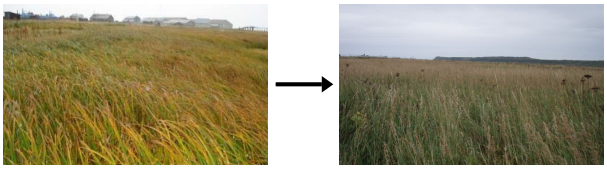


Bluejoint grass-American dunegrass/beach pea-Scottish licorice-root grassland

Lyngbye's sedge/purple marshlocks grassland

Powerful storm surges erode rises and create low areas susceptible to greater hydrologic influences. Silt deposition can affect soil properties. Vegetation shifts towards a community comprised of species with a higher tolerance to salt spray and salt and brackish water inundation.

Pathway 1.2a
Community 1.2 to 1.1



Lyngbye's sedge/purple marshlocks grassland

Bluejoint grass-American dunegrass/beach pea-Scottish licorice-root grassland

Soil builds as normal flooding events continue. Area elevation increase until conditions match those of the reference plant community.

Additional community tables

Inventory data references

Modal points for Community 1.1
07SS10102
07CS15301
07CS16102

Modal points for community 1.2
07CS16304

References

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Approval

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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	05/19/2024
Approved by	Kirt Walstad
Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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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:**
