USDA Natural Resources
Conservation Service

Ecological site R236XY102AK
Subarctic Dwarf Scrub Gravelly Slopes

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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 site is on rolling hummocks on plains. Site elevation ranges from 560 to 1,480 feet above sea level. Slopes are nearly level to undulating (0 – 5 percent). Poor soil development, acidic soil, and wind exposure shape the vegetation on this landform.

The reference state supports one community. The reference plant community is characterized as a closed low scrubland (Viereck et al., 1992). It is composed of a mix of ericaceous and other shrubs, with low growing graminoids and forbs throughout.

Associated sites

R236XY106AK	**Subarctic Dwarf Scrub Dry Loamy Slopes** R236XY106AK describes the low scrubland communities found on lower mountain slopes. It is found upslope of R236XY102AK. Differences in slope gradient and soil characteristics are reflected in different reference plant communities on these sites.
R236XY107AK	**Western Alaska Maritime Scrub Gravelly Drainages** F236XY107AK describes tall scrub drainageways. These drainageways dissect the plains that support R236XY102AK.

Similar sites

R236XY106AK	**Subarctic Dwarf Scrub Dry Loamy Slopes** Both sites describe a low scrubland dominated by ericaceous shrubs. The hummocks present in R236XY102AK are unique to this site and represent a frost heave process not found in R236XY106AK.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Empetrum nigrum* (2) *Betula nana*
Herbaceous	(1) *Carex microchaeta subsp. nesophila* (2) *Carex bigelowii*

Physiographic features

This site is on glaciated plain hummocks. Elevation ranges from 560 to 1480 feet above sea level. Slopes are gentle to nearly level (0 – 5 percent). Ponding and flooding do not occur. Aspect does not play a role in this site.

Table 2. Representative physiographic features

Geomorphic position, flats	(1) Talf
Landforms	(1) Plains > Plain > Hummock
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	560–1,480 ft
Slope	0–5%
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	560–1,480 ft
Slope	0–5%

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 is the main source of water.

Soil features

Soils are young and weakly developed Inceptisols (Soil Survey Staff, 2013). They are very deep and well drained. Soils support a cryic temperature regime and an udic moisture regime. Parent material is herbaceous organic material over coarse-loamy cryoturbate over gravelly outwash

Soil characteristics affecting vegetation include poor soil development, high subsurface rock fragment content, and low soil acidity. The soil on hummocks is poorly developed, as indicated by a cambic horizon. Cryoturbation transfers rock fragments towards the surface, where they constitute upwards of 15% of volume in the top-most soil layer. These conditions are ideal for slow growing ericaceous shrubs. Soil pH is extremely to moderately acidic throughout the profile. Ericaceous shrubs grow on and maintain acidic soil conditions, creating a positive feedback loop that favors ericaceous development and reproduction on this site.

Correlated soil components in MLRA 236: D36-Western maritime low scrub gravelly glaciated slopes

Table 5. Representative soil features

Parent material	(1) Outwash
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)	1.5–2.2 in
Soil reaction (1:1 water) (0-10in)	3.5–5.9
Subsurface fragment volume <=3" (Depth not specified)	15–35%
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)	1.5–2.2 in
Soil reaction (1:1 water) (0-10in)	3.5–5.9
Subsurface fragment volume <=3" (Depth not specified)	15–35%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site is on rolling hummocks on plains. Local site factors including microtopography and soil factors are responsible for one stable community in the reference state. The reference community phase is typified by dense scrubland of low and dwarf shrubs with some graminoids and patchy willow interspersed throughout.

The hummocked slopes described by this site are stable. There is no known major disturbance associated with this site. The undulating hummocks do not support a micro-topographic mosaic among high and low positions. The vegetative assemblage is best described by a single community phase.

Slight browsing of willow by moose is noted. This use does not result in a significant change in the structure and function of the community. No alternate states were observed 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

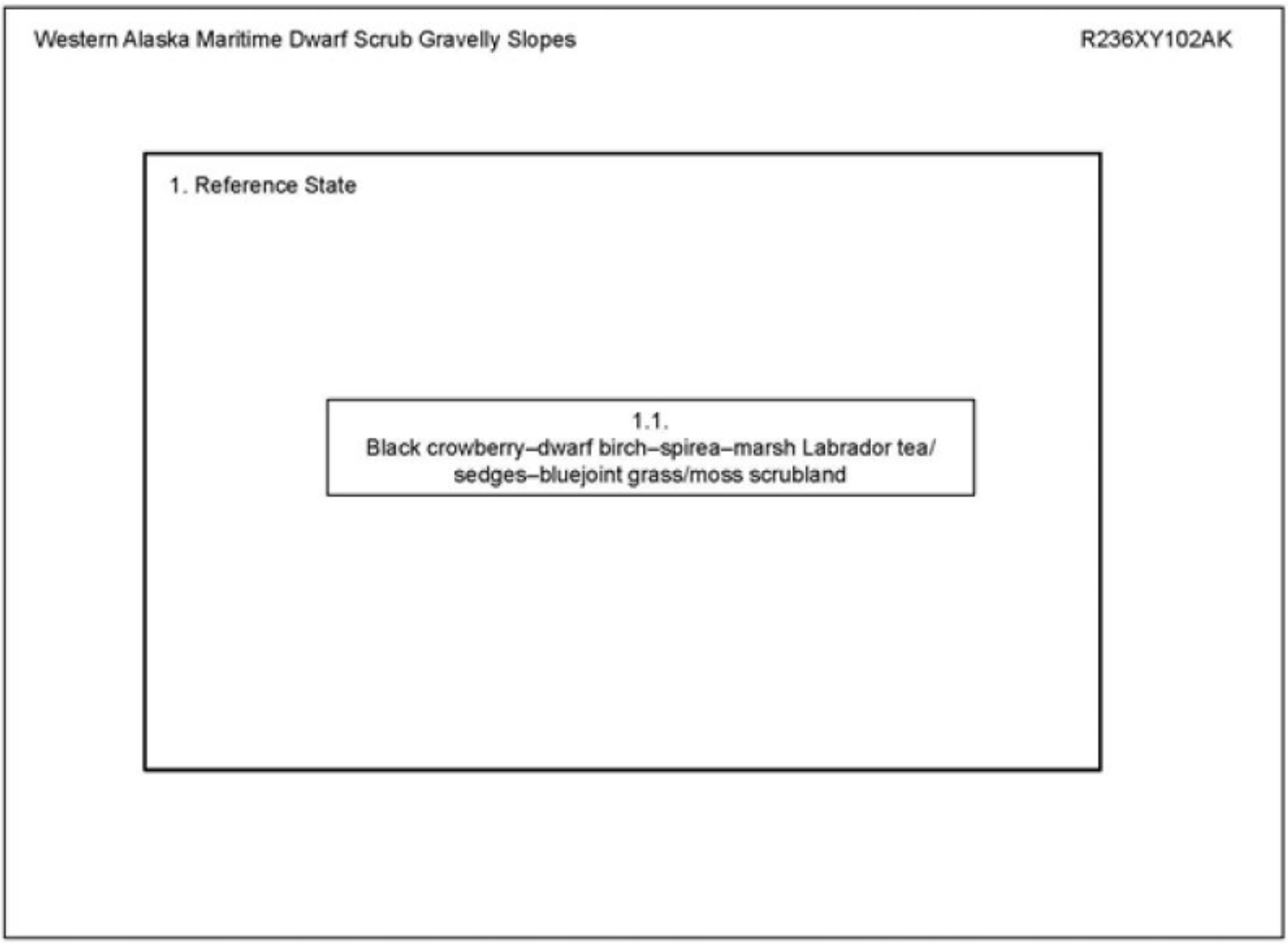

Figure 8. State-and-transition model.

State 1
Reference State

The reference community phase of this ecological site is stable, which likely is due to the relatively stable landform and lack of a disturbance regime. Natural variations in plant richness and cover may be evident. No known disturbance significantly alters the vegetative community; therefore, only a reference community phase is described. No alternate states have been observed.

Community 1.1
Black crowberry-dwarf birch-spirea-marsh Labrador tea/sedges-bluejoint grass/moss scrubland

Figure 9. 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	50
S	Dwarf birch	*Betula nana*	BENA	100	30
S	Marsh Labrador tea	*Ledum palustre* ssp. *decumbens*	LEPAD	100	10
S	Beauverd spirea	*Spiraea stevenii*	SPST3	100	8
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	100	15
S	Tealeaf willow	*Salix pulchra*	SAPU15	86	8
S	Lingonberry	*Vaccinium vitis-idaea*	VAVI	86	6
G	Bering Sea sedge	*Carex microchaeta* ssp. *nesophila*	CAMIN	86	10
G	Bluejoint grass	*Calamagrostis canadensis*	CACA4	71	6

Figure 10. Constancy and canopy cover of plants in community 1.1.

The reference community phase is characterized by dense, hummocky scrubland that consists dominantly of low and dwarf shrubs. Many shrub species are included, such as black crowberry (*Empetrum nigrum*), dwarf birch (*Betula nana*), spirea (*Spiraea stevenii*), bog blueberry (*Vaccinium uliginosum*), and marsh Labrador tea (*Ledum palustre* ssp. decumbens). Facultative and facultative wetland sedges are in the wetter micro-lows, including smallawned sedge (*Carex microchaeta*), variegated sedge (*Carex stylosa*), and Bigelow's sedge (Carex. bigelowii). Other hydrophilic plants may include arctic sweet coltsfoot (Petasites fridigus), Altai fescue (*Festuca altaica*), and arctic raspberry (*Rubus arcticus*). Scattered greyleaf willow (*Salix glauca*) and tealeaf willow (*Salix pulchra*) commonly are present. Mosses (about 35 percent average total cover) and lichens (about 15 percent) typically are on the surface. The ground cover may also include herbaceous litter (about 45 percent cover) and woody litter (about 10 percent). About 4 percent is bare soil.

Additional community tables

Inventory data references

Modal points for Community 1.1
08SS07905
08SS08007
08AO24203
09AO02702
09SS02203

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:**
