

Ecological site R240XY710AK

Arctic Scrub Wet Drainages

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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.

MLRA notes

Major Land Resource Area (MLRA): 240X–Nulato Hills-Southern Seward Peninsula Highlands

The Nulato Hills-Southern Seward Peninsula Highlands (MLRA 240X) is in Western Alaska, which describes the mostly treeless zone of discontinuous permafrost in the arctic. This MLRA is approximately 18,500 square miles in size. The terrain is defined by rolling hills, low mountains and river valleys. Flood plains systems are common but generally narrow. This watershed drains into Norton Sound and Bering Sea. Major rivers include the Unalakleet, Koyuk, and Fish Rivers. The area is mostly undeveloped wild land that is sparsely populated. Residents use this remote area primarily for subsistence hunting, fishing, and gathering. Villages are primarily located along the coast and include the two larger municipalities of Nome and Unalakleet, and various other villages such as Koyuk and Saint Michael. **Geology and Soils** This MLRA was mostly unglaciated during the late Pleistocene. Glaciers were limited to upper elevations on the Seward Peninsula. Coastal lowlands are filled with Holocene deposits. Silty eolian deposits mantle coastal areas and the slopes of lower elevation hills and mountains. Flood plains and terraces are built on fluvial deposits. Modified glacial moraines are evident in areas of past glacial activity. Bedrock material is primarily a mix of sedimentary and volcanic rock (USDA, 2022). This MLRA is in the zone of discontinuous permafrost. Shallow permafrost is most common on coastal plains, gentle footslopes, and organic swales. Permafrost constitutes a root- restrictive layer that perches water and creates poorly drained or poorly drained soils. Common soil orders include Gelisols that support permafrost and Entisols and Inceptisols which are marked by little to no development. The Gelisols are typically shallow or moderately deep to permafrost, occur on finer to gravelly textured sediments, and are poorly or very poorly drained. Common Gelisol suborders are Histels, Orthels, and Turbels. The Histels have thick accumulations of surface organic material and commonly occur on mounds of plains. The Orthels and Turbels have comparably thinner surface organic material. Turbels show signs of cryoturbation while Orthels do not. Entisols and Inceptisols are common on shallow rocky soils of the alpine and subalpine, as well as scoured flood plain soils. Non-soil areas (rock outcrop, rubble land and beaches) make up approximately five percent of the MLRA surface. **Climate** The climate is a mix of maritime in the summer and continental in the winter, which is a result of sea ice in Norton Sound. Summers are brief and cool summers and winters are long and cold. Mean annual precipitation is 15 to 20 inches at lower elevations, increasing to 20 to 40 inches at higher elevations (USDA, 2022). Mean annual temperatures ranges from 23 to 31 degrees F (SNAP, 2014a). **Vegetation** Vegetation is mainly influenced by site and soil characteristics such as temperature-degree days, exposure to wind, soil depth, and soil hydrology. Dwarf scrublands are present across much of the uplands. Lower elevations generally support more developed soils. Well drained soils support tall shrubs. Organic soils support mosses, graminoids and low shrubs. Forests occur on some low mountain slopes and river valleys but are associated with the Yukon-Kuskokwim Highlands (MLRA 230X). Tussock tundra is ubiquitous across much of the poorly drained, low gradient slopes and coastal plains (USDA, 2022).

LRU notes

There are two life zones delineated by plant communities along a temperature gradient driven by elevation. The predominant climate across MLRA 240X is arctic lowlands. Low mean annual air temperatures and a short growing season shape the vegetation across the landscape. The alpine climate zone is generally reserved for elevations above 1,200 feet. Decreased mean annual temperatures at these higher elevations support unique soils and vegetation.

Classification relationships

Alaska Vegetation Classification: Open low scrubland (II.C.2 - level III) / Willow open scrubland (II.C.2.i - level IV) (Viereck et al., 1992)
BioPhysical Settings: 6816830 – Alaska Arctic Mesic Sedge – Willow Tundra (Landfire, 2009) Circumpolar Arctic Vegetation Map: S2.1 – Low-shrub community (comm 45) G4.1 – Tussock-sedge, dwarf-shrub, moss communities (comm 41) (CAVM Team, 2003)

Ecological site concept

• Occurs on organic and mineral drainages on plains, hills and mountains slopes • Soils are classified as somewhat poorly to very poorly drained with aquic conditions • The reference plant community is an open willow scrubland • Fire is a major disturbance, resulting in a unique post-fire community. • Ponding in closed swales and at organic drainage centers supports an emergent herbaceous community that is unlikely to burn

Associated sites

R240XY720AK	Arctic Tussock Tundra Frozen Plains R240XY720AK describes the tussock tundra plain. R230XY710AK is in plain depressions and swales and is often surrounded by the tussock tundra.
R240XY731AK	Subalpine Ericaceous Scrub Loamy Slopes R240XY731AK describes the low ericaceous scrub subalpine community. R230XY710AK is in slope depressions and swales in the subalpine and these ecological sites often border each other.

Similar sites

R240XY731AK	Subalpine Ericaceous Scrub Loamy Slopes The wetter range of R240XY731AK supports willows that can appear similar to this ecological site. Differences in site and soil hydrology and the lack of a ponded community in R240XY731AK distinguish these ecological sites.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Salix pulchra</i> (2) <i>Salix barclayi</i>
Herbaceous	(1) <i>Calamagrostis canadensis</i>

Physiographic features

This ecological site occurs on swales and drainages on hills and plains. Elevation ranges from 100 to 1600 feet above sea level. Slope gradients are nearly level to gentle (0 to 5 percent) and occurs on all aspects. A water table is typically present throughout the growing season. Ponding occurs at low centers of closed swales and level organic drainages.

Table 2. Representative physiographic features

Slope shape across	(1) Concave (2) Linear
Slope shape up-down	(1) Concave (2) Linear

Landforms	(1) Plains > Drainageway (2) Plains > Swale (3) Hills > Drainageway (4) Plains > Swale
Runoff class	Negligible to low
Flooding duration	Not specified
Flooding frequency	None
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	30 – 490 m
Slope	0 – 10 %
Ponding depth	0 cm
Water table depth	0 – 30 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to frequent
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent

Elevation	Not specified
Slope	Not specified
Ponding depth	Not specified
Water table depth	Not specified

Climatic features

The mixed maritime/continental climate in MLRA 240X includes short, cool summers and long, cold winters. Mean annual temperature ranges from 23 to 31 degrees Fahrenheit, with temperatures typically below freezing from November through March. Approximately 40 percent of total precipitation occurs during the June – August growing season (PRISM, 2018; SNAP, 2014a; SNAP, 2014b). Across the MLRA, snowfall ranges from 40 to 100 inches (USDA-NRCS, 2022).

Table 4 Representative climatic features

Frost-free period (characteristic range)	80-110 days
Freeze-free period (characteristic range)	100-130 days
Precipitation total (characteristic range)	330-510 mm
Frost-free period (actual range)	30-120 days
Freeze-free period (actual range)	90-140 days
Precipitation total (actual range)	250-580 mm
Frost-free period (average)	90 days
Freeze-free period (average)	120 days
Precipitation total (average)	360 mm

Influencing water features

Some drainages flood and have a defined water flow path. Water is contained within the defined drainage, and there is no associated flood plain. Precipitation and seasonal snow melt are the main sources of water.

Wetland description

This ecological site is a depressional wetland under the Hydrogeomorphic (HGM) classification system (Brinson, 1993; USDA-NRCS 2008). Water sources include precipitation, throughflow, overflow and discharge. Closed concavities and level-sloped organic drainages

allow support surface ponding.

Soil features

Soils are wet with aquic soil conditions. Soils formed in organic material over loess and/or alluvium. Rock fragments are absent from the soil surface but comprise up to approximately twenty percent of the subsurface volume. Soils have a thick, 7-to-24-inch organic cap and are very deep. Moderately deep permafrost may be present, restricting roots and perching water. Soil pH is very strongly to slightly acidic. Soils are somewhat poorly to very poorly drained.

Table 5. Representative soil features

Parent material	(1) Loess (2) Alluvium
Surface texture	(1) Silt (2) Peat (3) Mucky peat
Drainage class	Somewhat poorly drained to very poorly drained
Permeability class	Moderately rapid
Depth to restrictive layer	Not specified
Soil depth	200 cm
Surface fragment cover ≤3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	14.48 – 31.5 cm
Soil reaction (1:1 water) (0-25.4cm)	4.7 – 10
Subsurface fragment volume ≤3" (0-152.4cm)	0 – 10 %
Subsurface fragment volume >3" (0-152.4cm)	0 – 10 %

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Depth to restrictive layer	70 – 150 cm
Soil depth	Not specified
Surface fragment cover ≤3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-25.4cm)	Not specified
Subsurface fragment volume ≤3" (0-152.4cm)	Not specified
Subsurface fragment volume >3" (0-152.4cm)	Not specified

Ecological dynamics

The Nulato Hills-Southern Seward Peninsula Highlands MLRA (MLRA 240X) occurs in Western Alaska with arctic vegetation and has a harsh climate that limits the composition and structure of plant communities. This area has cool, short summers and long, cold winters. Trees are restricted to warmer slopes in mountain valleys and flood plains. The expansive tundra is comprised of a mosaic of shrubs, sedges, moss, and lichen.

The reference plant community is shaped by local factors including aquatic soils and slope concavity. Vegetation in concave drainages and swales are not exposed to harsh winds. While available water capacity is adequate to support hydrophytic species such as willows and sedges.

Site and soil hydrology result in two communities. Soils that do not pond support the willow reference plant community. Ponded soils are in the center of closed swales and level organic drainages. Ponded soils support obligate and emergent herbaceous wetland species.

Fire is a major disturbance and results in one distinct post-fire community. Lightning strikes are the dominant ignition source. The willow scrubland and edges of organic depressions burn, while ponded wet soils do not. Fire dynamics are poorly understood on this ecological site, but it is hypothesized that they are dependent on fire severity and frequency. A major contributor to the reference plant community canopy, teal leaf willow (*Salix pulchra*) is a fire-adapted species and will quickly grow back if the below ground rootstock is not destroyed (Uchytel, 1991). One likely fire effect after a severe fire is the creation of open areas where fast growing, herbaceous species colonize. Without fire, site vegetation appears to be more influenced by shifts in site hydrology (Viereck et al., 1992), as described by the ponded

community (1.2).

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

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Inventory data references

Vegetative communities and transitions are described using existing models and expert knowledge. There are no vegetation inventory data points in NASIS associated with this ecological site. External model data sources: The Alaska-Yukon Region of the Circumboreal Vegetation Map (CBVM) (Jorgensen and Meidinger, 2015) Circumpolar Arctic Vegetation Mapping Project (CAVM, 2003). LANDFIRE Biophysical Settings Models (Landfire, 2009) The Alaska Vegetation Classification (Viereck et al., 1992)

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

Brinson, M.M. 1993. A hydrogeomorphic classification for wetlands. Technical Report WRP-DE-4, US Army Engineer Waterways Experiment Station, Vicksburg, MS.

CAVM Team. 2003. Circumpolar Arctic Vegetation Map. Scale 1:7,500,000. Conservation of Arctic Flora and Fauna (CAFF) Map No. 1. U.S. Fish and Wildlife Service, Anchorage, Alaska

Jorgensen, T., and D. Meidinger. 2015. The Alaska Yukon Region of the Circumboreal Vegetation Map (CBVM). CAFF Strategies Series Report. Conservation of Arctic Flora and Fauna, Akureyri, Iceland. ISBN: 978-9935-431-48-6.

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).

LANDFIRE Biophysical Settings (Landfire). 2009. Biophysical Setting 6816830 – Alaska Arctic Mesic Sedge – Willow Tundra. In: LANDFIRE Biophysical Setting Model: Map zone 68, [Online]. In: Vegetation Dynamics Models. In: LANDFIRE. Washington, DC: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory; U.S. Geological Survey; Arlington, VA: The Nature Conservancy (Producers). Available: <https://www.landfire.gov/vegetation/bps>. Accessed Dec 9, 2024

PRISM Climate Group (PRISM). 2018. Alaska – average monthly and annual precipitation and minimum, maximum, and mean temperature for the period 1981-2010. Oregon State University, Corvallis, Oregon. <https://prism.oregonstate.edu/projects/alaska.php>. Accessed Sept 17, 2024.

Scenarios network for Alaska and arctic planning (SNAP). 2014. Historical Monthly Temperature – 1km, 1901-2009. <http://ckan.snap.uaf.edu/dataset/>. Accessed Sept 17, 2024.

Scenarios network for Alaska and arctic planning (SNAP). 2014. 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 Sept 17, 2024.

Uchytíl, R.J. 1991. Salix pulchra. In: Fire Effects Information System, [Online].

U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <https://www.fs.usda.gov/database/feis/plants/shrub/salpul/all.html> Accessed Mar 10, 2025.

United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). 2008. Hydrogeomorphic Wetland Classification System: an overview and modification to better meet the needs of the Natural Resources Conservation Service. Technical Note No. 190-8-76. 8pp.

United States Department of Agriculture, Natural Resources Conservation Service. 2022. 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.

Western Regional Climate Center. 2021. Climate of Alaska. Retrieved from https://wrcc.dri.edu/Climate/narrative_ak.php. Accessed November 15, 2024.

Western Regional Climate Center. 2024. Unalakleet WSO Airport, Alaska 'Freeze Free' Season Probabilities. <https://wrcc.dri.edu/cgi-bin/cliTFrezD.pl?akunal>. Accessed Jan 23, 2025.

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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	10/06/2026
Approved by	

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:
