Ecological site R240XY702AK
Alpine Scrub Flood Plain Complex

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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 scrub (II.C.2 - level III) / Open low willow scrub (II.C.2.g – level IV) (Viereck et al., 1992) BioPhysical Settings: 6817150 – Alaska Arctic Floodplain (Landfire, 2009) Circumpolar Arctic Vegetation Map: Riparian areas – communities 65 & 66 (CAVM Team, 2003)

Ecological site concept

• Occurs on arctic flood plains • This ecological site is on gentle sloped river and stream valleys • Flooding is the major disturbance affecting vegetation on this site, and it results in two communities in the reference state • Soils are generally loamy, develop from alluvium and are moderately well to well drained • The reference plant community is a mixed willow scrubland with graminoids and forbs in the understory • One alternate state is correlated to beaver dams, and the effects dams have on site hydrology and vegetation

Associated sites

R240XY731AK	**Subalpine Ericaceous Scrub Loamy Slopes** R240XY731AK describes subalpine scrub slopes through which arctic flood plains pass through.
R240XY710AK	**Arctic Scrub Wet Drainages** R240XY710AK describes boreal wet drainages through which this ecological site is hydrologically linked.
F230XY614AK	**Boreal Black Spruce Unfrozen Well Drained Slopes** F230XY614AK describes black spruce non-permafrost slope through which this flood plain ecological site passes through.

Similar sites

R240XY710AK	**Arctic Scrub Wet Drainages** R240XY710AK describes boreal wet drainages. The drainages frequently pond, which also occurs in the beaver-affected alternate state of this ecological site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix alaxensis* (2) *Salix pulchra*
Herbaceous	(1) *Calamagrostis canadensis*

Physiographic features

This ecological site occurs on arctic flood plains, including those in the mountainous alpine. Elevation ranges from 500 to 1,300 feet above sea level. Slope gradients are nearly level to gentle (0 to 5 percent) and occurs on all aspects. A deep-water table is present throughout the growing season. Flooding is a natural disturbance. Ponding occurs upstream of beaver dams in the alternate state.

Table 2. Representative physiographic features

Slope shape across	(1) Linear
Slope shape up-down	(1) Linear
Landforms	(1) Valley > Flood plain

Runoff class	Negligible to very low
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	150 – 400 m
Slope	0 – 10 %
Water table depth	50 – 100 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding duration	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	60 – 460 m
Slope	0 – 10 %
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)	60-80 days

Freeze-free period (characteristic range)	80-100 days
Precipitation total (characteristic range)	330-510 mm
Frost-free period (actual range)	20-100 days
Freeze-free period (actual range)	70-110 days
Precipitation total (actual range)	250-580 mm
Frost-free period (average)	70 days
Freeze-free period (average)	90 days
Precipitation total (average)	360 mm

Influencing water features

This ecological site is influenced by riparian water features. Precipitation and seasonal snow melt are the main sources of water. Flood plains are usually unbraided but may braid in high energy locations.

Wetland description

This ecological site is a riverine wetland under the Hydrogeomorphic (HGM) classification system (Brinson, 1993; USDA-NRCS 2008). Overbank flow from the channel and subsurface hydraulic connections between the stream and adjacent wetlands are the main sources of water (Brinson, 1993).

Depth to the water table may decrease during peak snow melt and following summer storm events and increase during extended dry periods.

Soil features

Soils vary across the flood plain catena. All soils formed on gravelly alluvium. Soils are cold but lack permafrost. They are predominantly moderately well drained or well drained. The organic cap is thin, when present (1 to 2 inches). All soils are very deep. Surface rock fragments are minimal in the reference plant community but are present in high coverage in community 1.2. Subsurface fragments are about 5 to 40 percent by volume. Soil pH is moderately acidic to neutral.

Table 5. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Highly organic silt loam (2) Gravelly sandy loam
Drainage class	Moderately well drained to well drained

Permeability class	Moderately rapid
Soil depth	200 cm
Surface fragment cover <=3"	10 %
Surface fragment cover >3"	10 %
Available water capacity (0-101.6cm)	3.56 – 16.76 cm
Soil reaction (1:1 water) (0-25.4cm)	5.6 – 7.3
Subsurface fragment volume <=3" (0-152.4cm)	10 – 30 %
Subsurface fragment volume >3" (0-152.4cm)	0 – 10 %

Table 6. Representative soil features (actual values)

Drainage class	Poorly drained to well drained
Permeability class	Not specified
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.

This ecological site describes arctic flood plains. The vegetation is limited by the short arctic growing season. Water is readily available and medium to tall shrubs are present where flood energy is low.

Flooding in the major disturbance on this ecological site. This disturbance encapsulates flooding events and river channel migration. Floods are most common during the summer snow melt period. Areas proximal to the flood source experience high energy flooding. These floods scour the soil surface, eroding upper soil horizons and exposing alluvial parent material. Vegetation in this area is primarily resilient low willows and fast-growing herbaceous species. These areas typically have a water table during the growing season, which also influences vegetation. Elevated areas experience less frequent and less energetic flooding, allowing for the development of a taller willow canopy and a diverse understory. River channels move over time, affecting site hydrology and eventually can shift one community to the another. Channel movement cuts and erodes existing banks while simultaneously depositing sediments on new bars.

Beaver dams are responsible for an alternate state. Dams change site hydrology by permanently ponding areas. Many of the same plants are in both states, but the alternate state contains more obligate wetland species. Beaver dynamics in MLRA 240X are not well studied and further investigation is needed to describe the transformative pathways between the reference and alternate states.

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 (%)

Table 8. Community 1.2 plant community composition

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

Table 9. Community 2.1 plant community composition

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

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: Circumpolar Arctic Vegetation Mapping Project (CAVM, 2003). LANDFIRE Biophysical Settings Models (Landfire, 2009) The Alaska Vegetation Classification (Viereck et al., 1992)

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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	09/24/2026
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):**

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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:**
