USDA Natural Resources
Conservation Service

Ecological site R225XY313AK
Southern Alaska Scrub Loamy Oxbows

Last updated: 6/14/2025
Accessed: 03/10/2026

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): 225X–Southern Alaska Peninsula Mountains

Major Land Resource Area 225X (Southern Alaska Peninsula Mountains), herein called area, is in the Southern Alaska Land Resource Region (LRR). MLRA 225X covers approximately 23,935 square miles of the southern parts of the Kodiak Archipelago and the slopes of the southern Aleutian Mountains on the Alaska Peninsula. The landscape is comprised of rugged mountains separated by narrow valleys, with outwash plains and low hills towards the coast. Glaciers and ice fields cover the highest mountains. Flood plains are predominantly restricted to broad river valleys. Elevations range from sea level to 9,372 feet at the summit of Shishaldin Volcano. The soils and vegetation in this MLRA have been influenced by ash deposits from nearby Mount Katmai and surrounding volcanoes. This MLRA is primarily comprised of wilderness, with towns and villages primarily located along rivers, lakes, and the coast. Small villages are scattered along the coastline and include King Cove, Old Harbor, Karluk, and Larsen Bay among others. There is no road access to MLRA 225X from Anchorage, AK, and access is primarily via plane or boat.

MLRA 225X, excluding high peaks and steep upper backslopes, was glaciated during the Late Pleistocene. Glacial deposits were eroded or covered by colluvium or alluvium during the Holocene, which comprises 60 percent of the current landscape. Modified glacial moraines and outwash landforms are prevalent. Volcanic activity continues through the present day, and ash deposits are represented in many of the soils of this MLRA.

The dominant soil orders are Andisols, Histosols, and Inceptisols. Soils have a cryic temperature regime or subgelic soil temperature class, an aquic or udic soil moisture regime, and primarily amorphic mineralogy. Permafrost is sporadic in the Southern Alaska

LRR. The primary soils in this MLRA developed from volcanic ash over colluvium or from thick organic material. Miscellaneous (non-soil) areas comprise greater than 50 percent of all acreage in this MLRA and includes “rock outcrops, rubble land, glaciers, riverwash, and beaches” (USDA-NRCS, 2022).

The climate in this MLRA is shaped by maritime influences from Bristol Bay to the west and the Pacific Ocean to the south. Mountains effect local patterns in temperature and precipitation. Temperatures are typically cool throughout the year. The mean annual temperature at sea level is 37 to 43 degrees Fahrenheit. Precipitation ranges from 30 inches along the coast to over 100 inches at high elevations. Snowfall ranges from 50 to 200 inches and glaciers and icefields are present at higher elevations.

This MLRA is dominated by tall alder and willow shrubs at lower elevations. Vegetation shifts to low and then dwarf shrubs at increased elevations. Herbaceous communities are on exposed plains and hills, and sedges dominate wet depressions. Balsam poplar forests are restricted to flood plains and warm, low mountain slopes in the northern parts of the MLRA (USDA-NRCS, 2022).

LRU notes

MLRA 225X supports three life zones delineated by the physiological limits of plant communities along longitudinal and elevational gradients: Aleutian, South Alaska maritime, and South Alaska alpine. The Aleutian climate covers hills of the southern Kodiak archipelago and on the extended Alaska Peninsula. These regions are low-lying, exposed and are scoured by winter winds. Vegetation is primarily low shrublands, heathlands and often diverse herbaceous meadows. The South Alaska maritime climate is common in mountainous areas where local site conditions delineate alpine and lowland areas. Certain vascular plant species are common in the lowlands and much less common in the alpine (i.e. Populus balsamifera, Alnus spp., Salix pulchra, Betula nana, Ledum palustre ssp. decumbens, and Calamagrostis canadensis). The alpine generally occurs at elevations above 1,500 feet, though may extend higher on warm, north-facing slopes, and lower on cooler slopes. Vascular plants are restricted in height and often exclude common lowland species. The transition between South Alaska maritime and alpine vegetation can occur within a range of elevations, and is highly dependent on latitude, slope, aspect, and shading from adjacent mountains.

Classification relationships

Alaska Vegetation Classification:
Wet graminoid herbaceous (III.A.3 – level III) / Wet sedge herb meadow tundra (III.A.3.c - level IV)
(Viereck et al., 1992)

Circumboreal Vegetation Map – Alaska-Yukon Region: Southern Alaska Sphagnum Bogs and Herbaceous Fens

(Jorgensen and Meidinger, 2015)

BioPhysical Settings: 7617290 – Aleutian Floodplain Wetland
(Landfire, 2009)

Kodiak Archipelago Land Cover Classification:
Class 29 – Wet low willow
(Fleming and Spencer, 2007)

Ecological site concept

Ecological Site concept:
• Flood plain oxbows
• The reference plant community is a wet sedge herb meadow (Viereck et al., 1992).
• Soil and site hydrology shape vegetation by selecting for facultative to obligate wetland species
• Site experiences low energy flooding.

Associated sites

F225XY310AK	**Southern Alaska Riparian Complex Flood Plains** Forested riparian complex

Similar sites

R225XY302AK	**Southern Alaska Sedge Organic Depressions** R225XY302AK are depressions on the coastal plain

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix*
Herbaceous	(1) *Carex*

Physiographic features

This ecological site is in flood plain oxbows. Flooding is frequent and brief and is typically the result of seasonal snow melt or a large, upstream rain event. Ponding is frequent and very long. A water table is present at the surface throughout the growing season (May through September).

Table 2. Representative physiographic features

Landforms	(1) River valley > Flood plain (2) River valley > Oxbow
Runoff class	Negligible to low
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Frequent
Ponding duration	Very long (more than 30 days)
Ponding frequency	Frequent
Elevation	61–366 m
Slope	1–3%
Ponding depth	0–10 cm
Water table depth	0 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 duration	Not specified
Ponding frequency	Not specified
Elevation	40–838 m
Slope	Not specified
Ponding depth	Not specified
Water table depth	Not specified

Climatic features

The climate in this MLRA is shaped by the maritime influences of Bristol Bay to the west and the Pacific Ocean to the south. Cloudy days are the norm. Temperature and precipitation are patterned around mountainous effects. Temperatures are typically cool throughout the year. The mean annual temperature at sea level is between 37 and 43 degrees Fahrenheit and generally decreases as elevation increases. Precipitation ranges from 30 inches along the coast to over 100 inches at high elevations. Snowfall ranges from 50 to 200 inches and supports glaciers and icefields at higher elevations (USDA-NRCS, 2022). Frost-free and freeze-free periods in the city of Kodiak are presented in the table below (WRCC, 2024). These periods shorten as elevation increases, culminating in the shortest frost-free and freeze-free periods in the alpine.

Table 4. Representative climatic features

Frost-free period (characteristic range)	124-156 days
Freeze-free period (characteristic range)	164-195 days
Precipitation total (characteristic range)	737-1,930 mm
Frost-free period (actual range)	121-167 days
Freeze-free period (actual range)	153-199 days
Precipitation total (actual range)	356-2,515 mm
Frost-free period (average)	140 days
Freeze-free period (average)	173 days
Precipitation total (average)	1,346 mm

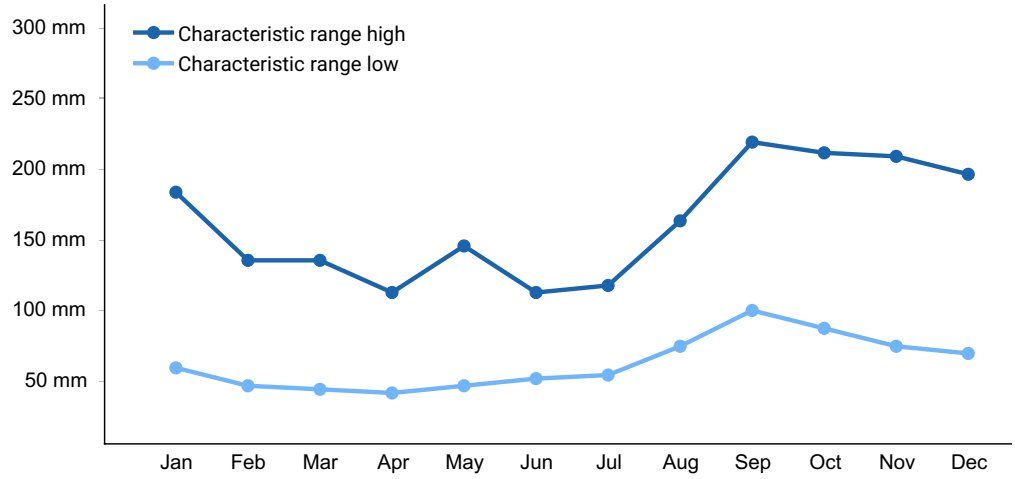

Figure 1. Monthly precipitation range

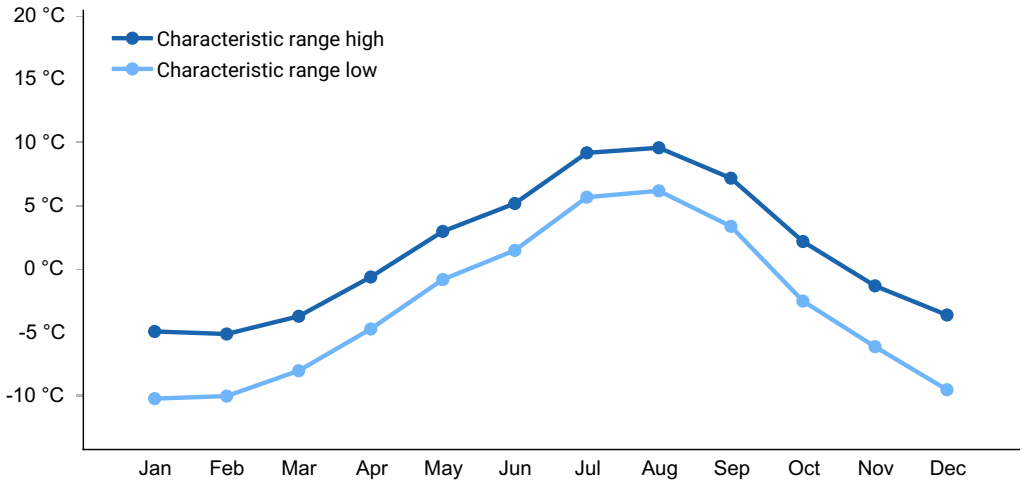

Figure 2. Monthly minimum temperature range

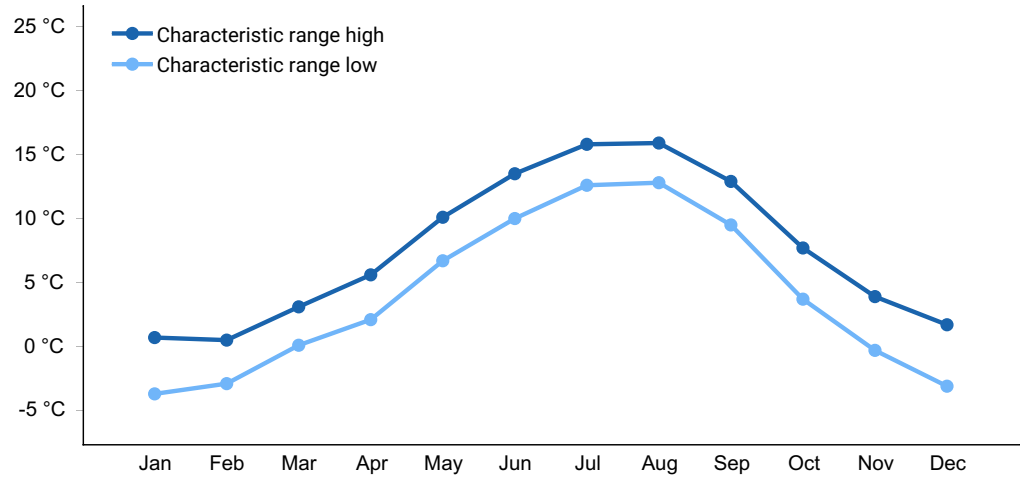

Figure 3. Monthly maximum temperature range

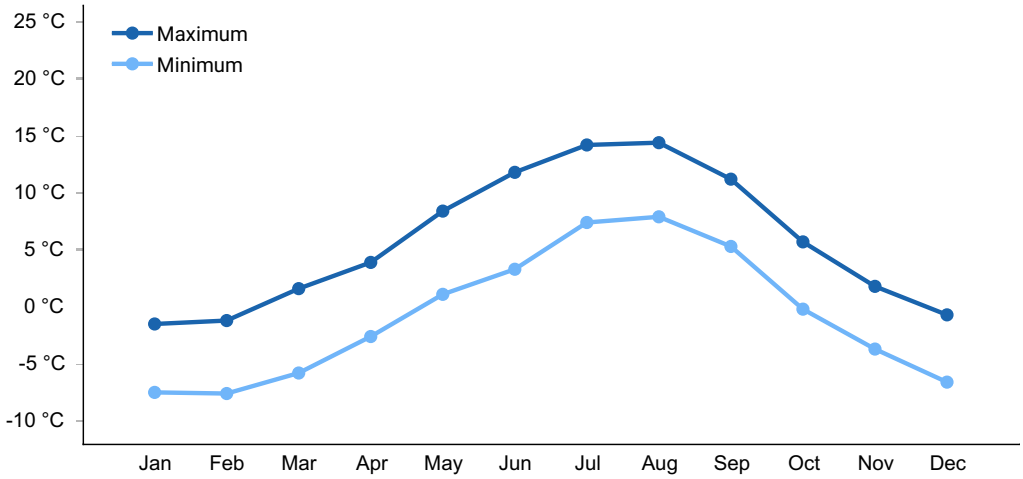

Figure 4. Monthly average minimum and maximum temperature

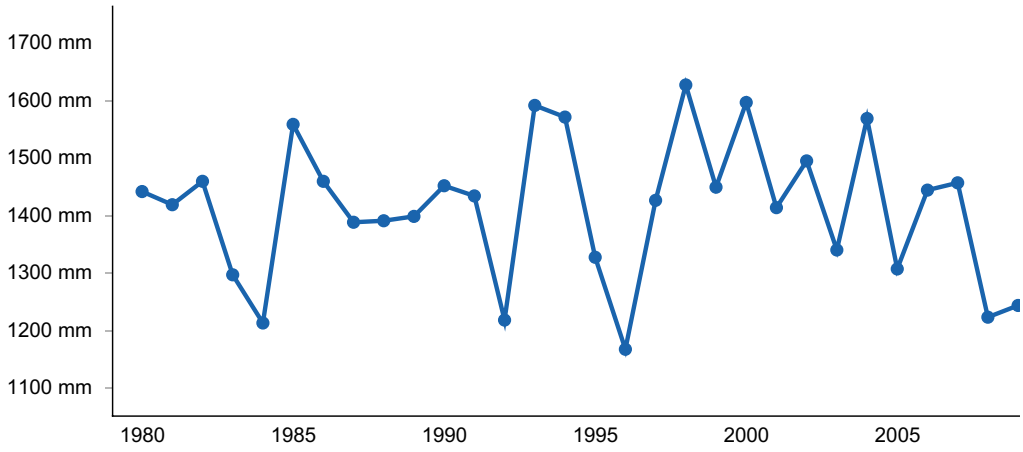

Figure 5. Annual precipitation pattern

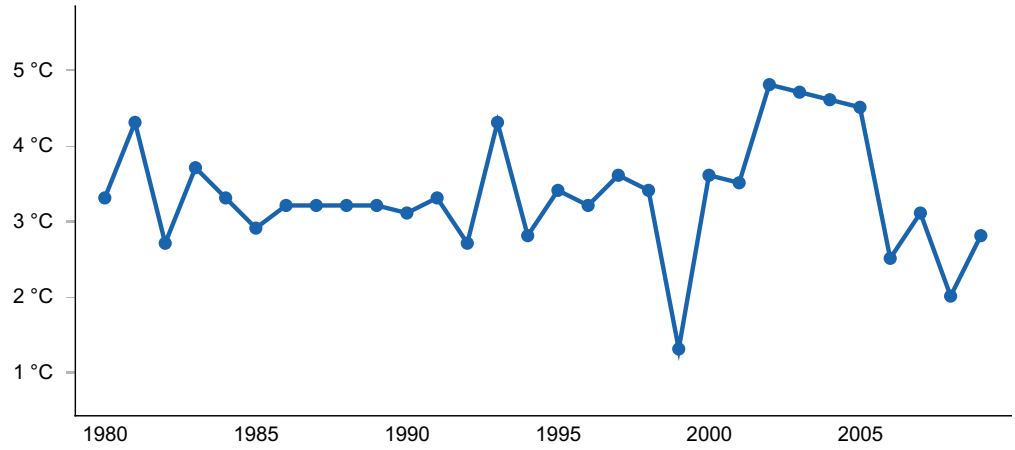

Figure 6. Annual average temperature pattern

Influencing water features

Oxbows are commonly ponded during the growing season. Ponding is frequent and very long. Hypoxic or anoxic conditions restrict vegetation (Vartapetian and Jackson, 1997). Emergent and floating vegetation is common.

Wetland description

This ecological site is part of the riverine wetland complex described by the hydrogeomorphic classification system (USDA, 2008; Brinson, 1993). Vegetation is comprised of predominantly facultative wet to obligate wetland species.

Soil features

Soils are organic Histosols with minimally decomposed organic matter (Soil Survey Staff, 2013). Parent material is organic material over sandy and silty alluvium. Soils are very deep and very poorly drained.

Soil hydrology is the main soil factor influencing vegetation. A water table is present at the soil surface throughout the growing season. Frequent, very long ponding to depths of four inches restricts vegetation to primarily facultative wet to obligate wetland species.

Correlated soil components in MLRA 225X: E25 – Maritime scrub/herbaceous-organic flood plains

Table 5. Representative soil features

Parent material	(1) Organic material (2) Alluvium
Surface texture	(1) Peat
Drainage class	Very poorly drained

Permeability class	Moderate
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	7.62–14.99 cm
Soil reaction (1:1 water) (0-25.4cm)	4.6–7
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This ecological site describes oxbows. Site and soil hydrology, especially ponding stress (Vartapetian and Jackson, 1997), shape the vegetative community. Vegetation is primarily restricted to facultative wet to obligate wetland species.

Site and soil hydrology shape a stable reference plant community. This site is wet throughout the growing season. Additional water inputs during the growing season do not affect the vegetation. Flooding is a frequent but very brief event, typically coinciding with periods of high spring melt. Flood plain cycles documenting river movement to oxbow creation to fill-in are too long to capture at a human timescale or on a management plan.

Oxbows often have ecotonal plant communities. Oxbows are mostly comprised of hydrophytic graminoids such as sedges, cottongrasses, and bluejoint. Outer rings may support more shrubs in the ecotonal zone between neighboring ecological sites. Oxbow centers can be permanently ponded and support emergent or floating vegetation.

There is no evidence of historical fire in this ecological site. To date, no alternative states have been documented on this site. Human activity currently has little impact on this site due to its remote location/inaccessibility. This site can be good habitat and support browse for moose.

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

1. Reference State

State 1 submodel, plant communities

1.1. Sedges - bluejoint / buttercups

State 1
Reference State

Figure 7. A flood plain complex in the background contains oxbow lakes with surface water ponded in their centers.

The reference state supports one stable community phase. The reference plant community is characterized by a wet sedge-herb meadow. Vegetation is influenced by site and soil drainage and is mostly restricted to facultative wet to obligate wetland species. This community is resilient to spring melt flooding and very long ponding events. All community phases in this report are characterized using the Alaska vegetation classification system (Viereck et al., 1992).

Dominant plant species

- willow (*Salix*), shrub

- water sedge (*Carex aquatilis*), grass
- Northwest Territory sedge (*Carex utriculata*), grass
- cottongrass (*Eriophorum*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- buttercup (*Ranunculus*), other herbaceous
- purple marshlocks (*Comarum palustre*), other herbaceous

Community 1.1
Sedges - bluejoint / buttercups

Figure 8. A flood plain complex in the background contains oxbow lakes with surface water ponded in their centers.

The reference plant community is a wet sedge herb meadow (Viereck et al., 1992). Vegetation is primarily facultative wet to obligate wetland species. Major plant groups are tall and medium graminoids, low shrubs, and dwarf forbs. Common species are likely to include water sedge, Northwest Territory sedge, bluejoint, willows, and buttercups. Oxbows with permanently ponded centers support emergent and floating plants. Ground cover is predominantly herbaceous litter, with more mosses around the edges and surface water at the oxbow center.

Dominant plant species

- willow (*Salix*), shrub
- water sedge (*Carex aquatilis*), grass
- Northwest Territory sedge (*Carex utriculata*), grass
- cottongrass (*Eriophorum*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- purple marshlocks (*Comarum palustre*), other herbaceous
- buttercup (*Ranunculus*), other herbaceous

Additional community tables

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 data sources:
The Alaska Vegetation Classification (Viereck et al., 1992)
The Alaska-Yukon Region of the Circumboreal Vegetation Map (CBVM) (Jorgensen and Meidinger, 2015)
LANDFIRE Biophysical Settings Models (Landfire, 2009)

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.

Fleming, M.D., and Spencer, P. 2007. Kodiak Archipelago Land Cover Classification User Guide. Available at https://akevt.gi.alaska.edu/data/Kodiak_UsersGuide_v1.1.pdf. Accessed April 24, 2024.

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.

Landfire. 2007. “Sept212007_0999_tag”. Photograph. NRCS Homer Soil Survey Office LandFire photo collection.

Landfire. 2009. Biophysical Setting 7617290 – Aleutian Floodplain Wetland. In: LANDFIRE Biophysical Setting Model: Map zone 76, [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/national_veg_models_op2.php. Accessed Feb 22, 2024.

PRISM Climate Group. 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.

Soil Survey Staff. 2013. Simplified Guide to Soil Taxonomy. USDA-Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

United State Department of Agriculture. 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.

United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). 2022. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture, Agriculture Handbook 296.

Vartapetian, B., and M. Jackson. 1997. Plant Adaptations to Anaerobic Stress. Annals of Botany. 79. 10.1093/oxfordjournals.aob.a010303.

Western Regional Climate Center. 2024. “Kodiak WSO Airport, Alaska ‘Freeze Free’ Season Probabilities.” https://wrcc.dri.edu/cgi-bin/cliTFrezD.pl?akkodi. Accessed Sept 19, 2024.

Contributors

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Acknowledgments

This soil – ecological site correlation was reviewed by a workshop team during a February 2024 PES workshop in Wasilla, AK.

This ecological site description (ESD) fulfills the requirements of the Provisional Ecological Site (PES) national initiative. This ESD is published to fit current site-soil correlations as they are currently mapped and understood. Further data collection may provide the

information to update this ESD from the provisional level to the approved level.

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	03/10/2026
Approved by	Blaine Spellman
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:**