USDA Natural Resources
Conservation Service

Ecological site F225XY315AK
Southern Alaska Forest Loamy Terraces

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

Landfire Biophysical Settings – 7616420 – Aleutian Kenai Birch-Cottonwood-Poplar Forest (Landfire, 2009)

Circumboreal Vegetation map (CBVM) – Southern Alaska Floodplain Spruce-Cottonwood Forests and Scrub (Jorgensen and Meidinger, 2015)

Viereck Communities:

Level III - Closed broadleaf forest (I.B.1) / Level IV – Black cottonwood closed forest (I.B.1.b)
(Viereck et al., 1992)

Kodiak Archipelago Land Cover Classification:
Class 11 – Dense cottonwood forest
Class 55 – Open-sparse cottonwood forest
(Fleming and Spencer, 2007)

Ecological site concept

Ecological Site concept:
• Occurs on river valley terraces
• The reference plant community is a closed broadleaf forest (Viereck et al., 1992)
• Soils comprised of volcanic ash or loess atop outwash material
• Soils are well drained
• This ecological site is stable. Flooding does not occur. Trees are susceptible to wind throw.

Associated sites

F225XY310AK	**Southern Alaska Riparian Complex Flood Plains** Forested riparian complex in mountain river valleys.
R225XY313AK	**Southern Alaska Scrub Loamy Oxbows** Oxbows on flood plains
F225XY360AK	**Southern Alaska Forest Loamy Hill Backslopes** Forest on lower mountain slopes.
R225XY363AK	**Southern Alaska Scrub Loamy Hill Backslope** Higher elevation scrublands on hill backslopes with bedrock-restricted soils.

Similar sites

F225XY310AK	**Southern Alaska Riparian Complex Flood Plains** R225XY310AK is the riparian complex on flood plains, which are shaped by alluvial processes not associated with this ecological site.
F225XY360AK	**Southern Alaska Forest Loamy Hill Backslopes** R225XY360AK describes deciduous forests on low mountain slopes.

Table 1. Dominant plant species

Tree	(1) *Populus balsamifera* (2) *Populus balsamifera ssp. trichocarpa*
Shrub	(1) *Salix barclayi* (2) *Sambucus racemosa*

Herbaceous	(1) *Calamagrostis canadensis* (2) *Chamerion angustifolium*

Physiographic features

This ecological site occurs on river valley terraces. Elevation ranges from 50 to 750 feet above sea level. Flooding and ponding do not occur. There is no water table.

Table 2. Representative physiographic features

Geomorphic position, terraces	(1) Tread
Slope shape across	(1) Linear
Slope shape up-down	(1) Linear
Landforms	(1) River valley > Stream terrace
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	30–305 m
Slope	1–2%
Water table depth	152 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	3–381 m
Slope	0–4%
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)	762-1,930 mm
Frost-free period (actual range)	121-167 days
Freeze-free period (actual range)	153-199 days
Precipitation total (actual range)	356-2,540 mm
Frost-free period (average)	140 days
Freeze-free period (average)	173 days
Precipitation total (average)	1,346 mm

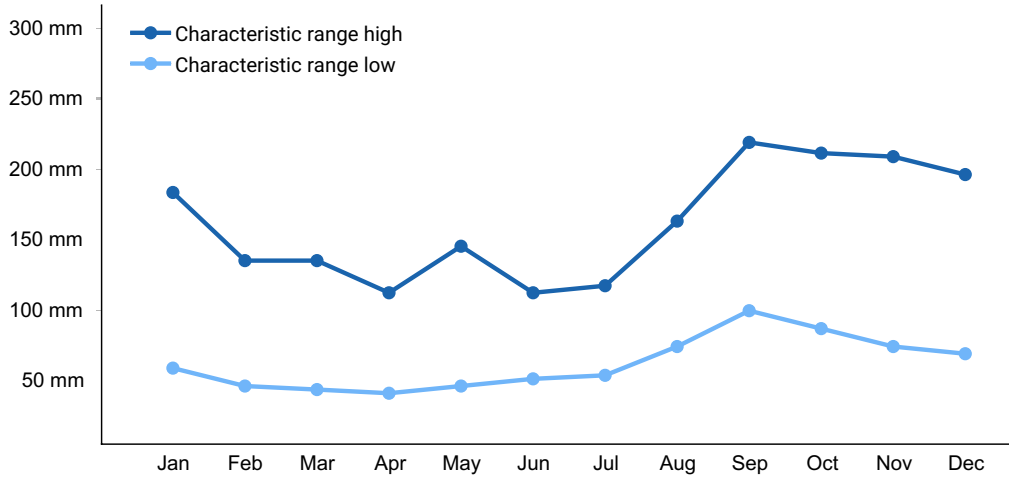

Figure 1. Monthly precipitation range

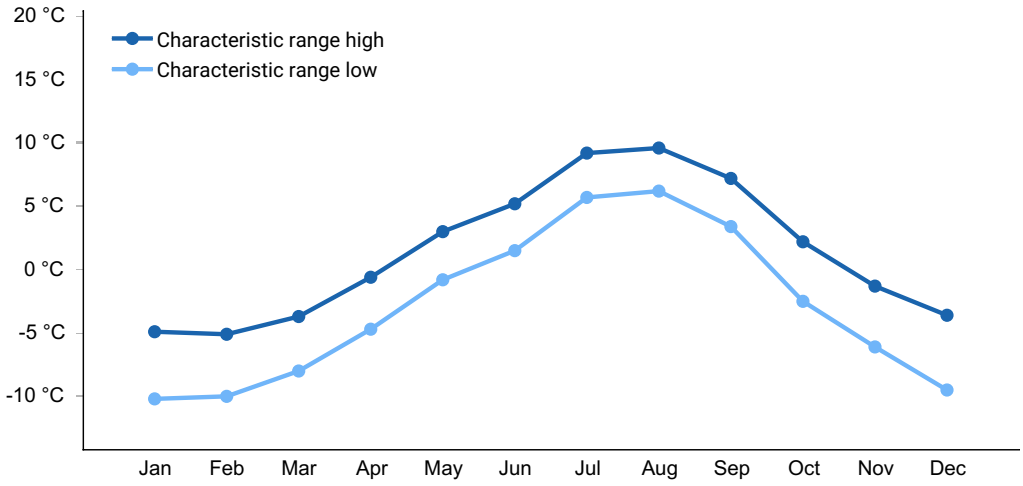

Figure 2. Monthly minimum temperature range

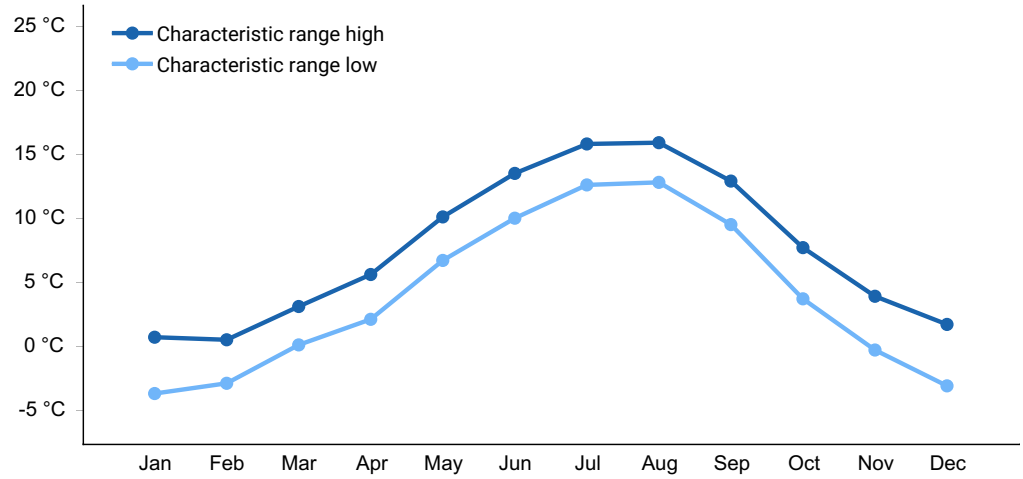

Figure 3. Monthly maximum temperature range

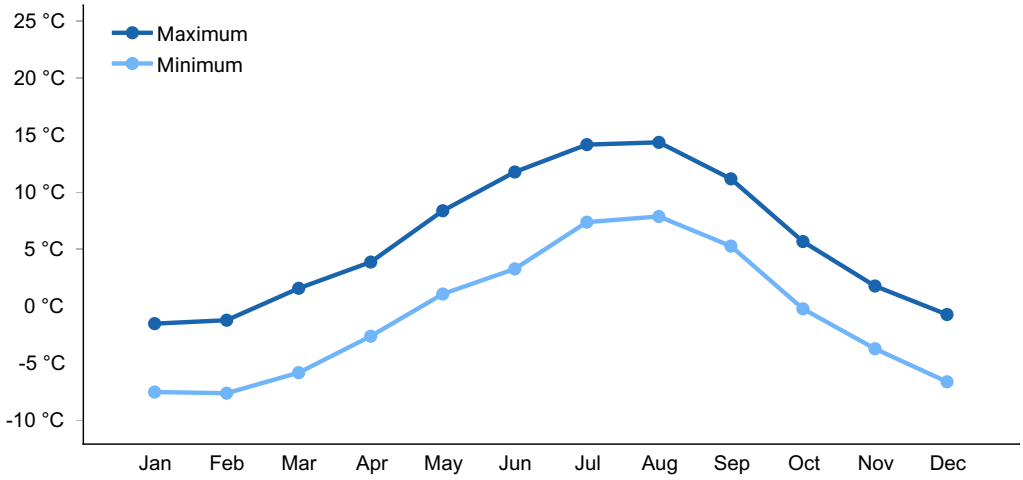

Figure 4. Monthly average minimum and maximum temperature

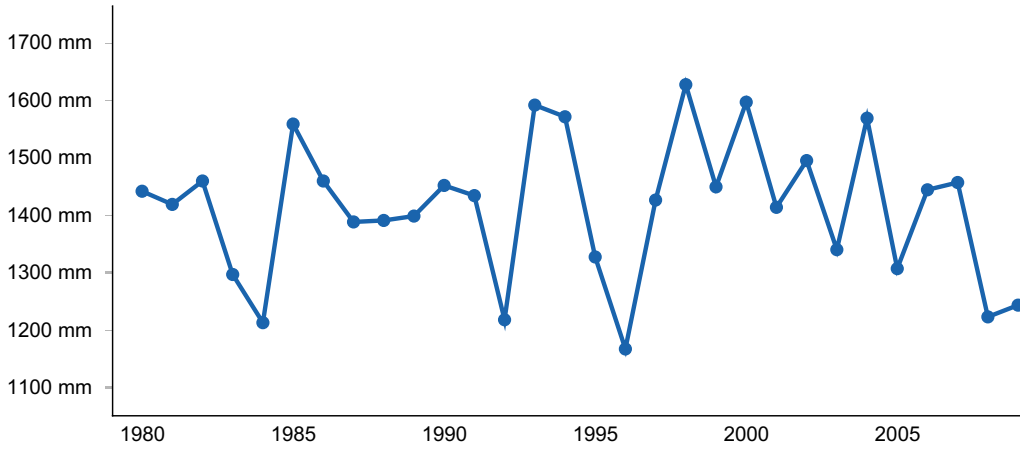

Figure 5. Annual precipitation pattern

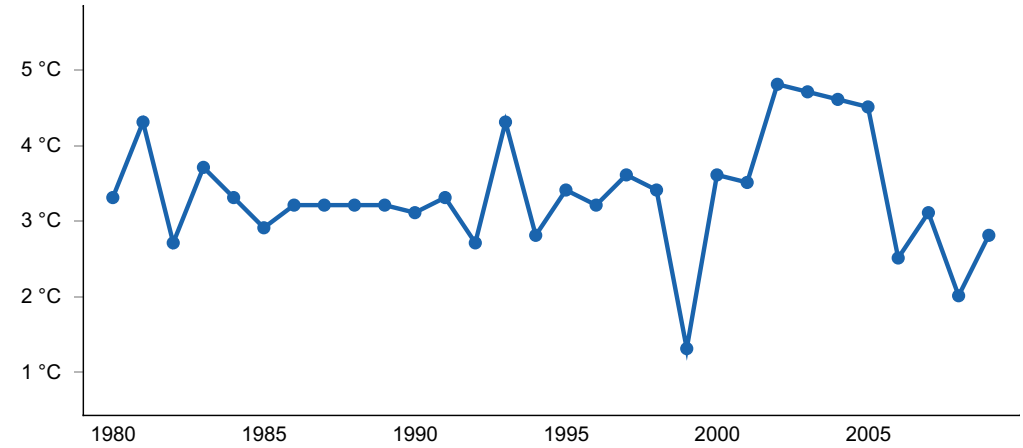

Figure 6. Annual average temperature pattern

Influencing water features

There are no surface water features on this ecological site.

Wetland description

This ecological site may be described by the hydrogeographic classification system as mineral soil flats (USDA, 2008; Brinson, 1993). Precipitation and throughflow are the main source of water for this ecological site. Surface runoff and throughflow contribute water to downslope ecological sites.

Soil features

Soils are derived from volcanic ash or eolian deposits atop outwash. Soils are well drained, very deep, and support an udic moisture regime and cryic temperature regime. The organic surface layer is thin (three inches), and no surface fragments are present. Subsurface fragments are about 5 to 30 percent by volume. Textural stratification occurs between 16 and 25 inches. Soil pH is very strongly to moderately acidic (pH 4.5 – 6.0).

Table 5. Representative soil features

Parent material	(1) Outwash (2) Volcanic ash (3) Eolian deposits
Surface texture	(1) Medial silt loam
Family particle size	(1) Medial over loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	41–64 cm
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	5.59–6.6 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5–6
Subsurface fragment volume <=3" (0-152.4cm)	24–26%
Subsurface fragment volume >3" (0-152.4cm)	5–11%

Ecological dynamics

The closed broadleaf forest reference plant community is shaped by air and soil temperature and available soil moisture. Warmer temperatures at these lower elevations support trees. Subsurface rock fragments transfer and store heat, creating soil temperatures suitable for tree growth. The closed canopy typically restricts plant richness and diversity in the understory (Viereck et al., 1992). Windthrow, bore snap and natural die back of trees brings light to the understory, contributing to a mix of shade tolerant and intolerant species. While primarily comprised of deciduous trees, spruce trees may be present near the border with MLRA 220X on the northern half of the Kodiak Archipelago.

Disturbance dynamics are poorly understood in this ecological site (Landfire, 2014; Viereck et al., 1992; Innes, 2014). Cottonwood stands are late successional in areas with spruce (Innes, 2014) but are the final successional forest stage in their absence. Fire frequency has not been recorded for this site and fire has previously not been considered important on this site (Innes, 2014). High-severity fires may destroy cottonwood canopies, and the roots of young cottonwood on gravel bars are particularly susceptible to fire (Steinberg, 2001). However, lightning-initiated fires are uncommon in south-central Alaska and natural fire frequency is low on this site (Innes, 2014; Jorgensen and Meidinger,

2015). Trees are susceptible to windthrow. These slopes are stable, but upslope avalanches may intrude on this site (Landfire, 2009; Viereck et al., 1992).

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. Cottonwood - balsam poplar / Barclay's willow – red elderberry / bluejoint - fireweed

State 1
Reference State

Figure 7. Broadleaf forest with understory of willow, grasses, and forbs.

The reference state supports one stable community. It is a broadleaf closed forest with a variable understory of shrubs and herbaceous plants. All community phases in this report are characterized using the Alaska vegetation classification system (Viereck et al., 1992).

Dominant plant species

- balsam poplar (*Populus balsamifera*), tree
- black cottonwood (*Populus balsamifera ssp. trichocarpa*), tree
- Barclay's willow (*Salix barclayi*), shrub
- red elderberry (*Sambucus racemosa*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- fireweed (*Chamerion angustifolium*), other herbaceous

Community 1.1
Cottonwood - balsam poplar / Barclay’s willow – red elderberry / bluejoint - fireweed

Figure 8. Broadleaf forest with closed understory of tall shrubs, graminoids, and ferns.

The reference plant community is a closed broadleaf forest (Viereck et al., 1992). The forest canopy is comprised of cottonwood and/or balsam poplar. Sitka spruce may be present, particularly near the northern limits of MLRA 225. The understory is variable. Various tall and medium shrubs may be present, including Barclay’s willow, red elderberry, alder, and highbush cranberry. Diverse herbaceous species comprise the lower vegetation stratum and can include bluejoint, fireweed, horsetails, and various ferns (Landfire, 2009). Ground cover is a mix of mosses, lichens and herbaceous litter.

Dominant plant species

- black cottonwood (*Populus balsamifera ssp. trichocarpa*), tree
- balsam poplar (*Populus balsamifera*), tree
- Barclay's willow (*Salix barclayi*), shrub

- red elderberry (*Sambucus racemosa*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- fireweed (*Chamerion angustifolium*), 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.

Innes, Robin J. 2014. Fire regimes of Alaskan black cottonwood communities. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory (Producer). Available: www.fs.usda.gov/database/feis/fire_regimes/AK_black_cottonwood/all.html [2024, March 1].

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. 2009. Biophysical Setting 7616420 – Aleutian Kenai Birch-Cottonwood-Poplar Forest. In: LANDFIRE National Vegetation Dynamics Models. USDA Forest Service and US Department of Interior. Washington, DC.

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.

Steinberg, Peter D. 2001. Populus balsamifera subsp. trichocarpa. 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/tree/popbalt/all.html [2024, March 1].

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.

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

Phil Barber
Blaine Spellman
Marji Patz

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:**