USDA Natural Resources
Conservation Service

Ecological site R225XY335AK
Southern Alaska Tall Scrub Loamy Backslopes

Last updated: 6/14/2025
Accessed: 02/15/2026

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 begin at higher elevations 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:
Tall closed scrubland (II.B.1 – level III) / Closed Tall Alder Shrub (II.B.1.b – level IV) (Viereck et al., 1992)

Circumboreal Vegetation Map – Northern Pacific Maritime (undifferentiated) (Jorgensen and Meidinger, 2015)

LANDFIRE BioPhysical Settings: 7617180 – Aleutian Mesic Alder-Salmonberry Shrubland (Landfire, 2009)

Kodiak Archipelago Land Cover Classification:
Class 37 – Open alder-salmonberry-elderberry
(Fleming and Spencer, 2007)

Ecological site concept

Ecological Site characteristics:
• Supports a stable tall alder scrubland in the reference plant community
• Occurs on mountain and hill slopes beyond treeline on portions of the Alaska Peninsula and Kodiak Archipelago.
• Soils typically exhibit a lack of nutrient availability (ash parent material or a restrictive layer)
• Alder is the dominant species
• No site ponding or flooding
• Well drained soils without a water table during the growing season

Associated sites

R225XY330AK	**Alpine Dwarf Scrub Slopes** Alpine dwarf scrubland that occurs upslope on mountain summits and shoulders
R225XY333AK	**Southern Alaska Scrub Steep Backslopes** Low birch-ericaceous shrubland on steeper mountain slopes
R225XY364AK	**Southern Alaska Scrub Loamy Plain Depressions** Wetland scrubland depressions on plains

Similar sites

R225XY333AK	**Southern Alaska Scrub Steep Backslopes** These ecological sites develop on similar soils. Differences in abiotic characters such as slope steepness and local climate lead to different vegetation in the reference state.
F225XY310AK	**Southern Alaska Riparian Complex Flood Plains** Post flood communities on the riparian complex flood plain may resemble the alder community of this site. However, soils and landforms are unsimilar.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Alnus* (2) *Rubus spectabilis*

Herbaceous	(1) *Calamagrostis canadensis*

Physiographic features

This site occurs on the slopes of mountains and plains below the alpine life zone. Elevation ranges from 100 to 1500 feet. Slope gradients are strongly sloped to moderately steep. Flooding and ponding do not occur and there is no water table in the soil profile. This site generates moderate amounts of runoff to adjacent, downslope sites.

Table 2. Representative physiographic features

Slope shape across	(1) Linear
Slope shape up-down	(1) Linear (2) Convex
Hillslope profile	(1) Backslope
Geomorphic position, mountains	(1) Mountainflank
Geomorphic position, flats	(1) Talf
Landforms	(1) Mountains > Mountain slope (2) Plains > Plain
Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	30–457 m
Slope	5–30%
Water table depth	152 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Low to high
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	30–1,219 m
Slope	0–35%
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

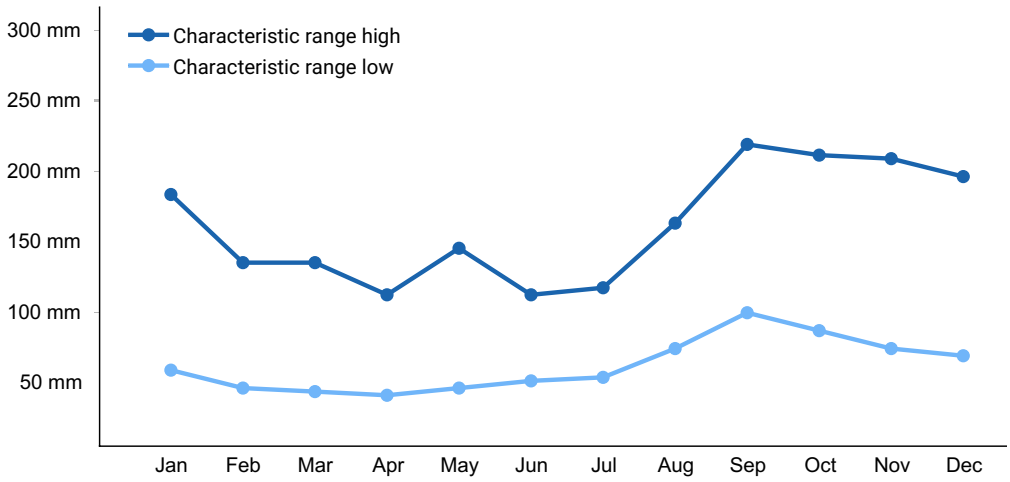

Figure 1. Monthly precipitation range

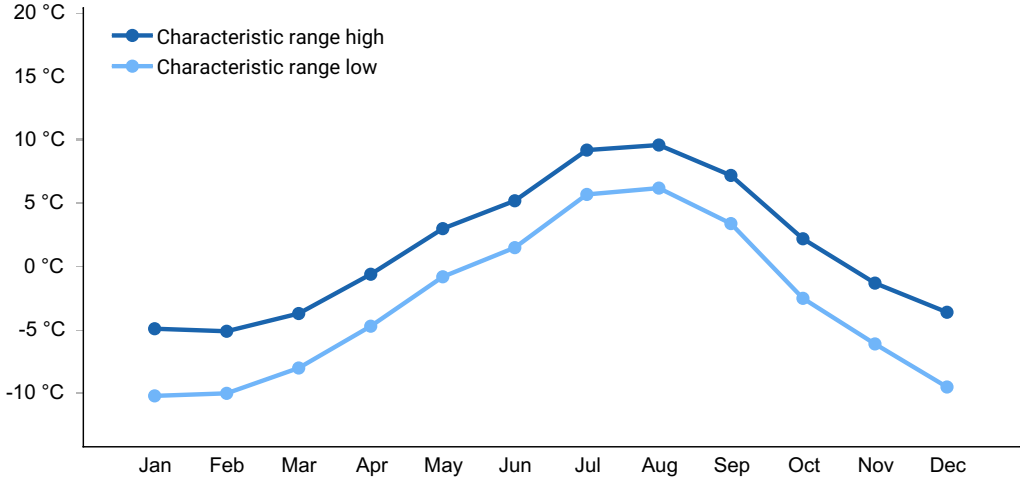

Figure 2. Monthly minimum temperature range

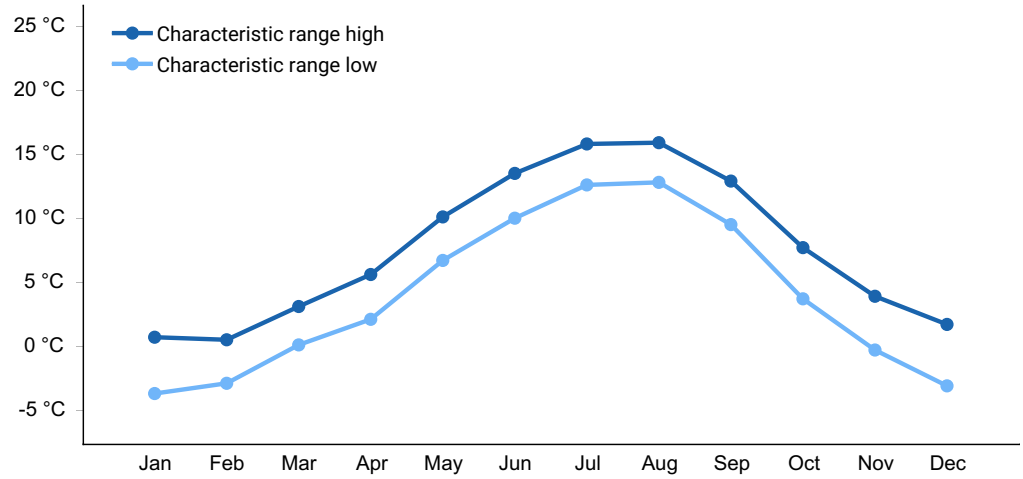

Figure 3. Monthly maximum temperature range

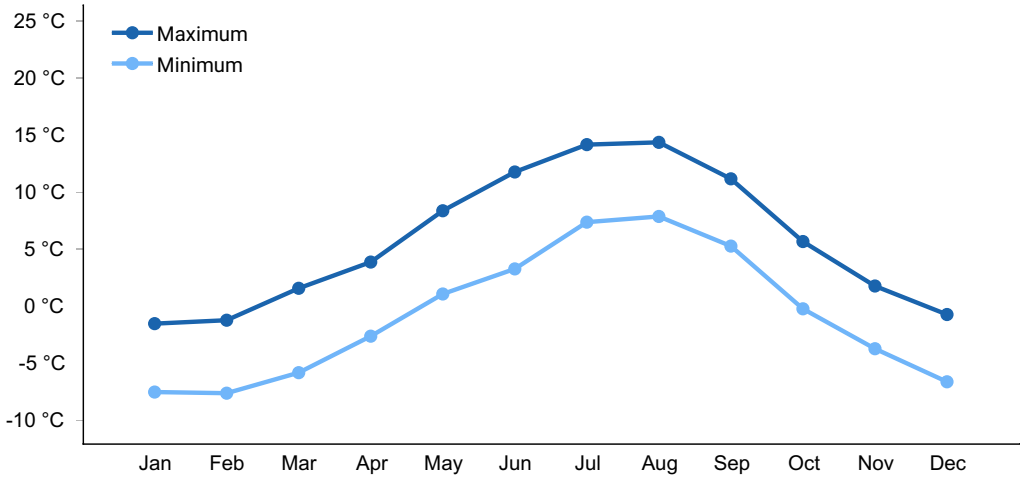

Figure 4. Monthly average minimum and maximum temperature

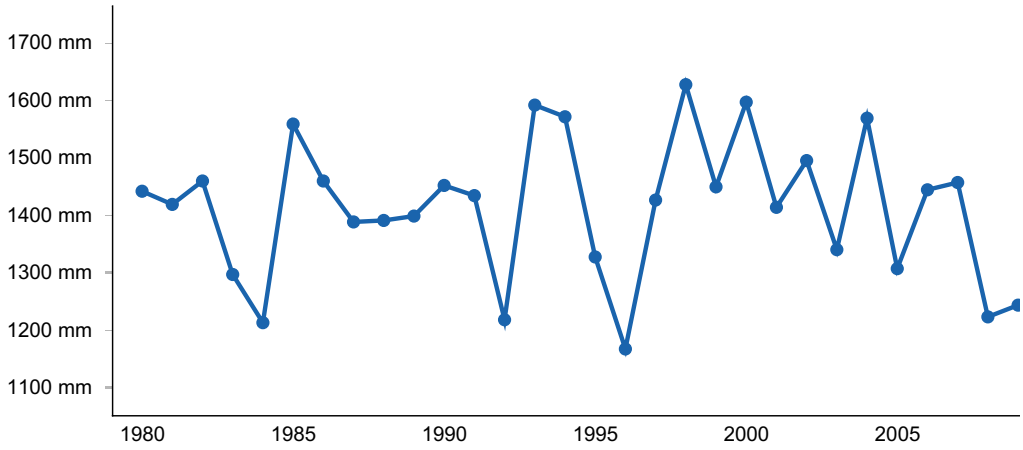

Figure 5. Annual precipitation pattern

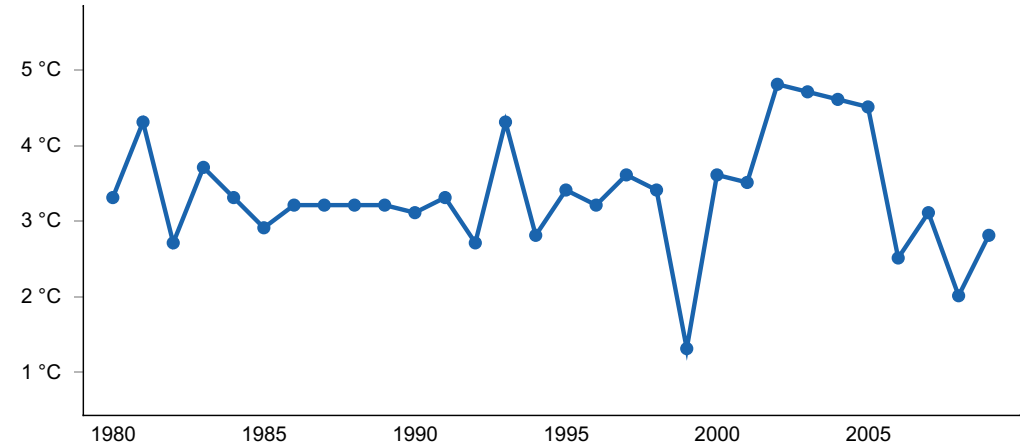

Figure 6. Annual average temperature pattern

Influencing water features

This site is not associated with or influenced by streams or wetlands. Precipitation and throughflow are the main sources of water. Surface runoff and throughflow contribute water to downslope ecological sites.

Soil features

Soils vary from volcanic Andisols to minimally developed Entisols (Soil Survey Staff, 2013). Soils are derived primarily from volcanic ash over till. The organic horizon is between two and three inches thick. These are deep to very deep soils that contact bedrock at 48 to 60 inches or greater depth in the soil profile. Most soils lack root restrictions. Soils with ash over till have contrasting textural stratification resulting in root restrictions at moderate depths. Soils are dry during the growing season and considered well to excessively well drained. Surface rock fragments are not present. Subsurface fragments range from approximately 20 to 45 percent of the soil profile by volume. Soil pH varies widely.

Correlated soil components in MLRA 225X: E25-Maritime tall scrub-ashy till slopes, E25-Maritime tall scrub-sandy volcanic slopes, E25-Maritime tall scrub-ashy till slopes, moderately deep

Table 5. Representative soil features

Parent material	(1) Volcanic ash (2) Till
Surface texture	(1) Medial, highly organic silt loam (2) Silt loam
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	51–152 cm
Soil depth	122–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	1.52–8.38 cm
Soil reaction (1:1 water) (0-25.4cm)	3.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	16–30%
Subsurface fragment volume >3" (Depth not specified)	2–13%

Ecological dynamics

Tall alder scrublands are shaped by local site and soil factors. Nutrient availability appears to play a major role. Soils are either comprised of volcanic ash parent material or contain a restrictive layer. Alder supports nitrogen-fixing nodules in its roots and is a common colonizing species on rocky and nutrient-poor soils. Growing season temperatures are warm enough to support tall alder growth but too cold to support trees. This site grades into an ericaceous shrubland at higher elevations and a deciduous forest (where present) at lower elevations.

The reference plant community is stable. In general, fire dynamics are poorly understood in Alaska alder communities (Innes, 2015). Fire is infrequent on sites that typically support alder (Uchytil, 1989). Alder has non-flammable bark and non-resinous leaves, which somewhat protect individuals from low intensity fire (Uchytil, 1989). Of note, forest and ericaceous shrubland slopes that burn are susceptible to alder colonization, particularly after a severe fire that destroys the organic soil layer (Uchytil, 1989). Alder may be susceptible to insect damage and disease, opening the understory to herbaceous shade-

intolerant species (Landfire, 2009).

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. Alder – salmonberry / bluejoint / ladyfern - fireweed

State 1
Reference State

Figure 7. A thick alder scrubland as seen early in the growing season, before full leaf-out.

Figure 8. View from within an alder-salmonberry thicket. The mountain in the background also supports the same green scrubland.

The reference state supports one plant community. The reference plant community is characterized as a tall alder scrubland. Vegetative patchiness does not appear to be site specific or fire driven. All community phases in this report are characterized using the Alaska vegetation classification system (Viereck et al., 1992).

Dominant plant species

- alder (*Alnus*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- common ladyfern (*Athyrium filix-femina*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous

Community 1.1
Alder – salmonberry / bluejoint / ladyfern - fireweed

Figure 9. A thick alder scrubland as seen early in the growing season, before full leaf-out.

Figure 10. View from within an alder-salmonberry thicket. The mountain in the background also supports the same green scrubland.

The reference plant community is a closed tall alder shrubland (Viereck et al., 1992). The major plant groups are tall shrubs, medium shrubs, tall forbs, and tall graminoids. Alders are dominant in the canopy. Alder cover may approach 100 percent cover. This community can be a mosaic, with clumps of alder surrounded by salmonberry with small herbaceous patches throughout. Common species include alder, salmonberry, bluejoint, fireweed, and ladyfern. Ground cover is predominantly herbaceous litter.

Dominant plant species

- alder (*Alnus*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- common ladyfern (*Athyrium filix-femina*), other herbaceous

- 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

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. 2015. Fire regimes of Alaskan alder and willow shrublands. 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_alder_shrub/all.html [2024, March 15].

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 7617180 – Aleutian Mesic Alder-Salmonberry Shrubland. 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.

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 Science Division Staff. 2017. Soil survey manual. C. Ditzler, K. Scheffe, and H.C. Monger (eds.). USDA Handbook 18. Government Printing Office, Washington, D.C.

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

Uchytil, Ronald J. 1989. Alnus viridis subsp. sinuata. 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/alnvirs/all.html [2024, March 15].

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, 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

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Marji

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	02/15/2026
Approved by	Blaine Spellman
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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:**
