USDA Natural Resources
Conservation Service

Ecological site R224XY742AK
Subalpine Scrub Moist Slopes Ecological Site Group

Last updated: 6/13/2025
Accessed: 01/22/2026

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): 224X–Cook Inlet Lowlands

Major Land Resource Area (MLRA) 224X consists of lowlands and lower mountain slopes of the Susitna and Matanuska Valleys, western Kenai Peninsula, and west side of Cook Inlet. It makes up about 10,965 square miles (28,400 square kilometers). The terrain is a broad expanse of braided flood plains, high gradient rivers, rolling plains, terraces and hills bordered by the surrounding mountains. This MLRA contains a large percentage of Alaska's total population and includes the most extensive road systems in the state. Major rivers include the Susitna, Yentna, Little Susitna, Matanuska, Kenai, and Deep Creek that all drain into Cook Inlet. Large lakes include Tustumena and Skilak.

Climate is highly variable ranging from temperate maritime to continental subarctic. Winter arctic weather systems are common in the northern portion of the MLRA. The average annual precipitation ranges from 15 to 60 inches (380 to 1,525 millimeters). The average annual snowfall is about 60 to 120 inches (150 to 305 centimeters). The average annual temperature is about 27 to 36 degrees F (-3 to 2 degrees C). The freeze-free period averages 65 to 160 days, decreasing with elevation.

Vegetation ranges from spruce/birch forests in the lowlands to subalpine scrubland at high elevations. Saltwater meadows along the coast and wetlands and extensive marsh occur throughout the lowlands across the valley. In most years precipitation is adequate for crops, with limited irrigation. Major rivers are affected by high sediment-laden glacial meltwater and ice dam damage and flooding is a risk during spring thaw. Water is hard or very hard, with high potential levels of iron, but is otherwise of excellent quality. Alpine vegetation is associated with the adjacent Cook Inlet Mountains MLRA (223X).

The dominant soil orders in this MLRA are Spodosols, Histosols, Entisols, and Inceptisols. Water, riverwash, beaches, and other miscellaneous (non-soil) areas are 15 percent of this MLRA. Glacial and volcanic ash wind-blown deposits influence much of area, while fluvial deposits are common in riparian areas.

The MLRA is visited by a great number of migrating birds and supports large populations of waterfowl. Most of the rivers and streams are important spawning grounds for salmon (Chinook, coho, and red salmon). Peonies, hay, potatoes, and hardy vegetables are important agriculture with a few dairy and beef cattle farms present. Commercial logging and subsistence firewood gathering are locally important, as is subsistence gathering. Other major industries in the area include commercial fishing, fish processing, and oil and gas extraction. Tourism and wildland recreation are becoming increasingly important.

The major resource concerns are water erosion and water quality. Aquifers are highly susceptible to contamination from runoff. The intrusion of seawater can be a problem along Cook Inlet. Rapid development and off-road recreation are creating significant damage to the wildlands.

LRU notes

This MLRA is a transitional zone between temperate maritime and continental subarctic climatic zones to the south and areas of arctic winter weather patterns to the north. With this transition, there are major variations in climatic influences and vegetative responses. With further soil survey and vegetative surveys, this MLRA will be evaluated for potential Land Resource Unit (LRU) development.

Ecological site concept

• This subalpine ecological site occurs on swales and mountain slopes.
• Soils formed in loess and/or volcanic ash over gravelly till, glacial drift and/or outwash.
• Soils range from deep to very deep, with depth controlled by bedrock.
• Soils do not flood or pond. These somewhat poorly drained soils have a shallow to moderately deep water table for extended portions of the growing season.
• Reference state vegetation is characterized as closed low scrub - low willow. This site has no known disturbance regimes and has one plant community within the reference state.

Associated sites

R223XY706AK	**Alpine scrub wet depressions and drainageways** Occurs in adjacent high-elevation drainages.
R224XY741AK	**Subalpine Herbaceous Wet Slopes Ecological Site Group** Occurs on adjacent subalpine slopes with wetter soils that support herbaceous meadows.

R224XY743AK	**Subalpine Scrub Dry Slopes Ecological Site Group** Occurs on adjacent subalpine slopes with drier soils that support a mosaic of Sitka alder scrubland and herbaceous meadows.

Similar sites

R224XY743AK	**Subalpine Scrub Dry Slopes Ecological Site Group** Both 742 and 743 support shrubby plant communities. Ecological site group 743 supports tall scrub communities dominated by Sitka alder.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix barclayi* (2) *Salix pulchra*
Herbaceous	(1) *Calamagrostis canadensis* (2) *Gymnocarpium dryopteris*

Physiographic features

- Occurs on mountain slopes and swales on mountain slopes. Earth hummocks are occasional periglacial features, which are cored with silty mineral soil and are typically 4 to 20 inches in height and 8 to 125 inches in diameter (Schoeneberger and Wysocki 2017).
- Elevation typically ranges from 1,500 to 2,500 feet but can go to lower elevations on colder north facing slopes and to higher elevations on warmer south facing slopes.
- Flooding and ponding do not occur.
- A shallow to moderately deep water table occurs for extended portions of the growing season (16 to 32 inches).
- Slopes are moderately steep and occur on all aspects.
- Associated with low to very high amounts of runoff to adjacent, downslope ecological sites.

Table 2. Representative physiographic features

Hillslope profile	(1) Summit (2) Shoulder (3) Backslope
Landforms	(1) Mountains > Swale (2) Mountains > Mountain slope > Earth hummock
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	457–762 m

Slope	15–30%
Water table depth	41–81 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	274–762 m
Slope	Not specified
Water table depth	Not specified

Climatic features

Climate is highly variable, generally ranging from temperate maritime to continental subarctic. Most weather systems originate in the North Pacific and the Gulf of Alaska. In winter, particularly in the northern part of the area, arctic weather systems are more common. In the Matanuska Valley, seasonal winds pick up fine-earth material from unvegetated flood plains and create extensive dust clouds that can reach an altitude of 5,000 feet (1,525 meters) or more. The average annual precipitation ranges from 15 to 60 inches (380 to 1,525 millimeters). It generally is higher on the southern Kenai Peninsula, in the northern Susitna Valley, and at the higher elevations along the mountains. The average annual snowfall is about 60 to 120 inches (150 to 305 centimeters). The average annual temperature is about 27 to 36 degrees F (-3 to 2 degrees C). The freeze-free period averages 65 to 160 days, decreasing in length with elevation. (USDA-NRCS 2022).

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/. Point Mackenzie, Anchorage INTL AP, Talkeetna AP, Homer AP, and Kenai Muni AP are the representative climate stations. The following graphs and charts are a collective sample representing the averaged normals and 30-year annual rainfall data for the selected weather stations from 1981 to 2010.

Table 4. Representative climatic features

Frost-free period (characteristic range)	84-115 days
Freeze-free period (characteristic range)	118-142 days
Precipitation total (characteristic range)	457-635 mm
Frost-free period (actual range)	81-117 days
Freeze-free period (actual range)	112-144 days

Precipitation total (actual range)	432-686 mm
Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	533 mm

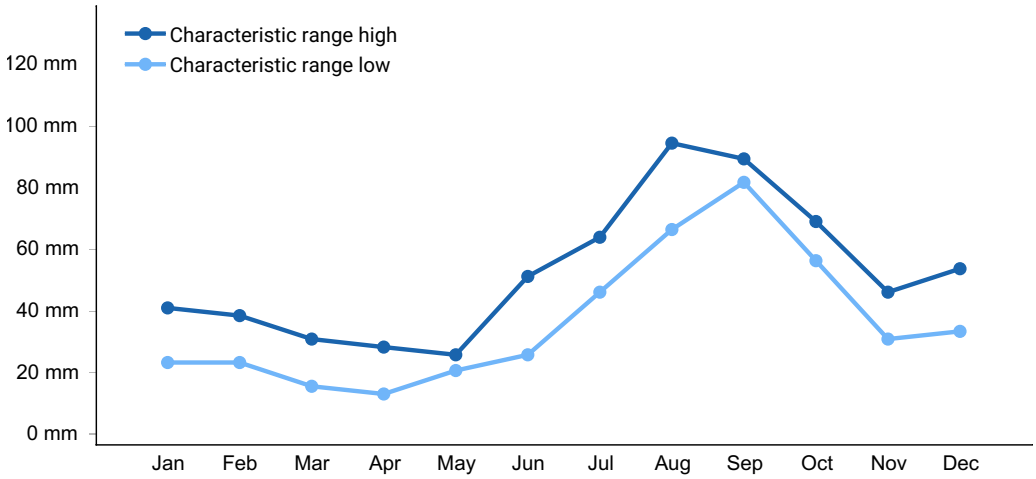

Figure 1. Monthly precipitation range

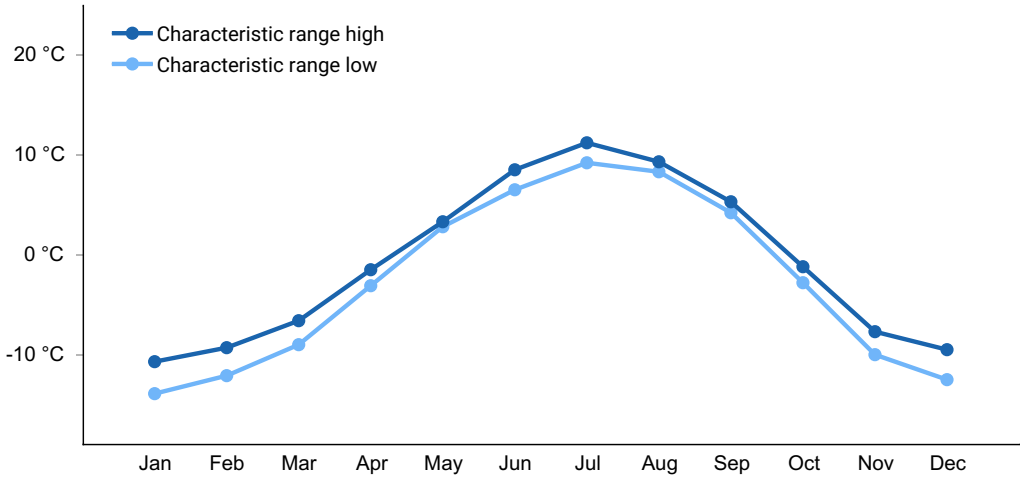

Figure 2. Monthly minimum temperature range

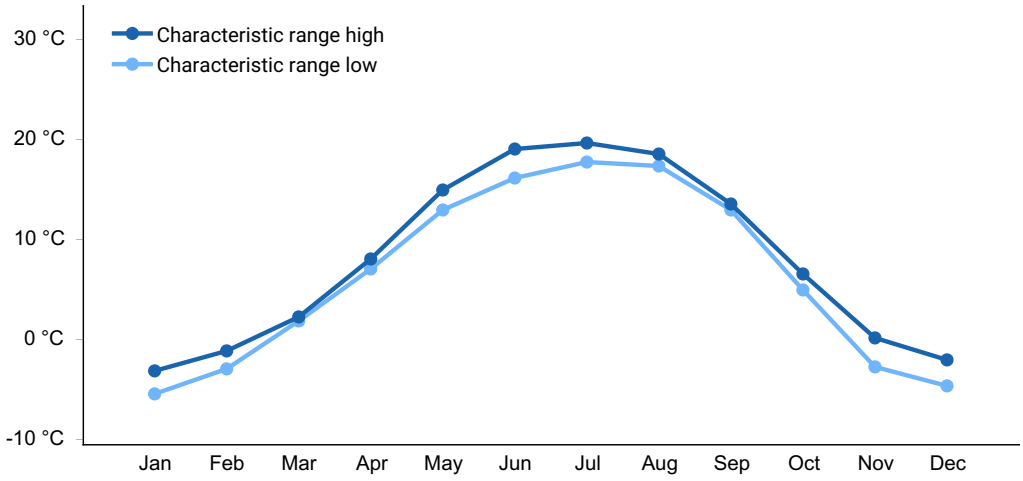

Figure 3. Monthly maximum temperature range

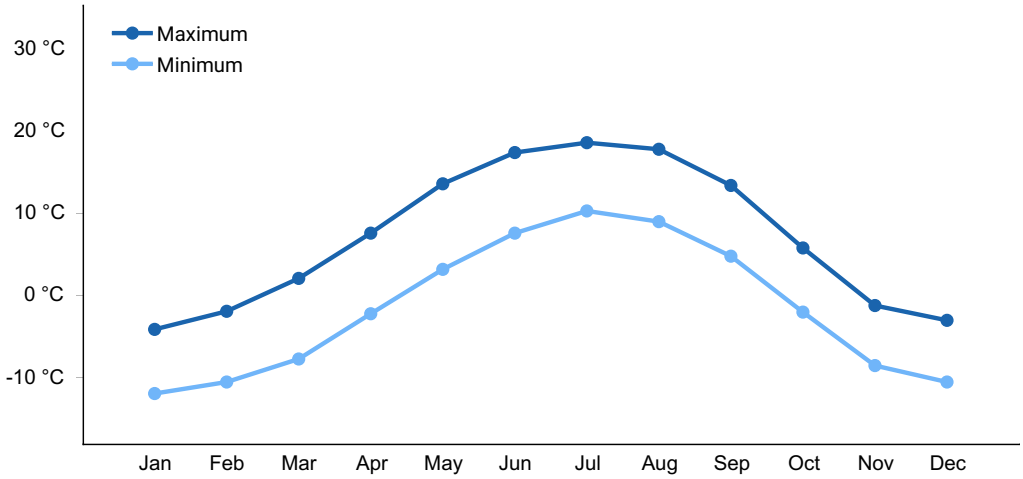

Figure 4. Monthly average minimum and maximum temperature

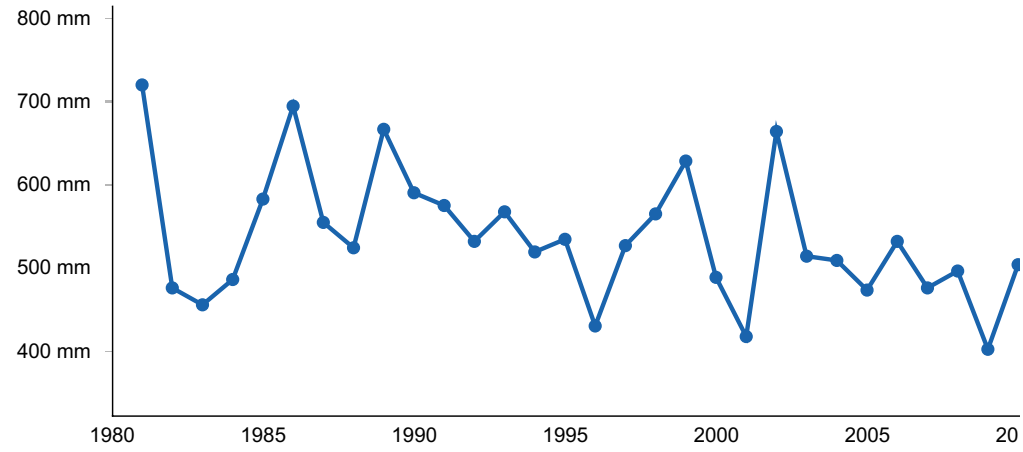

Figure 5. Annual precipitation pattern

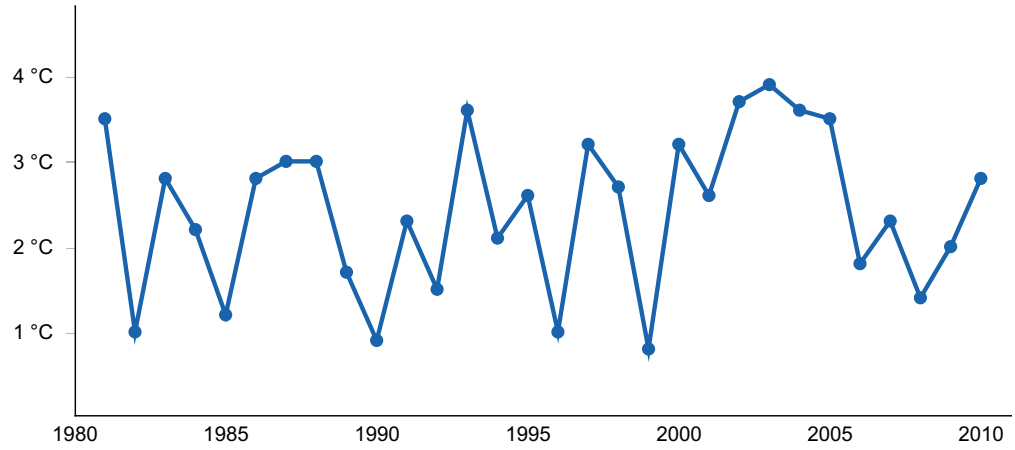

Figure 6. Annual average temperature pattern

Climate stations used

- (1) TALKEETNA AP [USW00026528], Talkeetna, AK
- (2) POINT MACKENZIE [USC00507444], Wasilla, AK
- (3) ANCHORAGE INTL AP [USW00026451], Anchorage, AK
- (4) KENAI MUNI AP [USW00026523], Kenai, AK
- (5) HOMER AP [USW00025507], Homer, AK

Influencing water features

This ecological site is not influenced by water table or streams.

Wetland description

This ecological site is not a wetland.

Soil features

- Soils formed in loess and/or volcanic ash over gravelly till, glacial drift, and/or outwash.
- Rock fragments cover up to five percent of the soil surface.
- These mineral soils are capped with up to three inches of organic material. The surface mineral horizon texture is mucky silt loam or cobbly silt loam.
- Subsurface rock fragments range between 4 and 40 percent or more of the soil profile by volume.
- Soils are deep to very deep, which is controlled by bedrock. Strongly contrasting textural stratification is a restriction that occurs at very shallow to moderate depths (9 to 22 inches).
- Soils are acidic with the pH of the soil profile ranging from very strongly acidic to slightly acidic.
- Soils are considered somewhat poorly drained with very slow to moderately rapid permeability.

This Subalpine Scrub Moist Slopes Ecological Site Group is correlated to three soil components. These soils are classified as Inceptisols and Spodosols. The great group for Inceptisols is Eutrocryepts.

Table 5. Representative soil features

Parent material	(1) Volcanic ash (2) Loess (3) Till (4) Outwash (5) Drift
Surface texture	(1) Mucky silt loam (2) Cobbly silt loam
Drainage class	Somewhat poorly drained
Permeability class	Very slow to moderately rapid
Depth to restrictive layer	23–56 cm
Soil depth	150–183 cm
Surface fragment cover <=3"	0–9%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	2.79–15.49 cm
Calcium carbonate equivalent (25.4-101.6cm)	0%
Clay content (0-50.8cm)	5%
Electrical conductivity (25.4-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (25.4-101.6cm)	0
Soil reaction (1:1 water) (25.4-101.6cm)	4.5–6.5
Subsurface fragment volume <=3" (0-152.4cm)	1–31%
Subsurface fragment volume >3" (0-152.4cm)	4–11%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified

Depth to restrictive layer	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
Calcium carbonate equivalent (25.4-101.6cm)	Not specified
Clay content (0-50.8cm)	Not specified
Electrical conductivity (25.4-101.6cm)	Not specified
Sodium adsorption ratio (25.4-101.6cm)	Not specified
Soil reaction (1:1 water) (25.4-101.6cm)	Not specified
Subsurface fragment volume <=3" (0-152.4cm)	Not specified
Subsurface fragment volume >3" (0-152.4cm)	4–22%

Ecological dynamics

Located in the subalpine life zone, ecological site R224XY743AK is exposed to a variety of harsh conditions including high winds, persistent snowpack, and extremely cold temperatures. Persistent snowpack and cold temperatures reduce the growing season in the subalpine, when compared to lower elevations. These harsh climate conditions result in dominance of scrub and herbaceous communities and limit tree growth and reproduction.

State and transition model

Ecosystem states

1. Reference

State 1 submodel, plant communities

1.1. willow/western oakfern/bluejoint

State 1
Reference

The reference plant community is characterized as closed low scrub - low willow (Viereck et al. 1992). This site has no known associated disturbance regimes and has one plant community within the reference state. The vegetation modeled for this site has limited data and is considered provisional.

Dominant plant species

- willow (*Salix*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- western oakfern (*Gymnocarpium dryopteris*), other herbaceous

Community 1.1
willow/western oakfern/bluejoint

Vegetation consists of dense low willow scrub. Associated herbaceous cover varies from sparse to moderately abundant. Common plant species include bluejoint reedgrass, Altai’s fescue, northern geranium, false hellebore, Canadian burnet, and oak fern.

Dominant plant species

- Barclay's willow (*Salix barclayi*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- Richardson's willow (*Salix richardsonii*), shrub
- netleaf willow (*Salix reticulata*), shrub
- feltleaf willow (*Salix alaxensis*), shrub
- beauverd spirea (*Spiraea stevenii*), shrub
- bluejoint (*Calamagrostis canadensis*), grass
- Altai fescue (*Festuca altaica*), grass
- sedge (*Carex*), grass
- woolly geranium (*Geranium erianthum*), other herbaceous
- green false hellebore (*Veratrum viride*), other herbaceous
- Canadian burnet (*Sanguisorba canadensis*), other herbaceous
- western oakfern (*Gymnocarpium dryopteris*), other herbaceous
- common ladyfern (*Athyrium filix-femina*), other herbaceous
- field horsetail (*Equisetum arvense*), other herbaceous

- yellow thimbleweed (*Anemone richardsonii*), other herbaceous
- dwarf marsh violet (*Viola epipsila*), other herbaceous
- Aleutian violet (*Viola langsdorffii*), other herbaceous
- western cordilleran bunchberry (*Cornus unalaschkensis*), other herbaceous
- arctic raspberry (*Rubus arcticus*), other herbaceous

Table 7. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	1-80%
Grass/grasslike foliar cover	1-40%
Forb foliar cover	1-40%
Non-vascular plants	0-80%
Biological crusts	0%
Litter	0-70%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0-5%
Bedrock	0%
Water	0%
Bare ground	0%

Table 8. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	2-40%
>0.3 <= 0.6	–	–	1-40%	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	20-80%	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

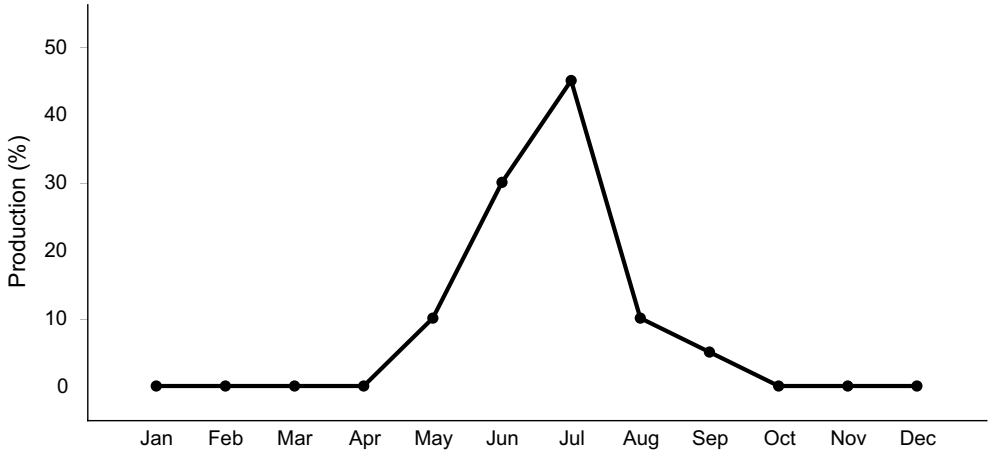

Figure 7. Plant community growth curve (percent production by month). AK0022, Southern. 60-200 days.

Additional community tables

Table 9. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
bluejoint	CACA4	*Calamagrostis canadensis*	Native	–	1–40
Altai fescue	FEAL	*Festuca altaica*	Native	–	1–25
Fern/fern ally					
western oakfern	GYDR	*Gymnocarpium dryopteris*	Native	–	2–40
Shrub/Subshrub					
Barclay's willow	SABA3	*Salix barclayi*	Native	–	20–65
feltleaf willow	SAAL	*Salix alaxensis*	Native	–	5–40

Animal community

not available

Hydrological functions

not available

Recreational uses

not available

Wood products

not available

Other products

not available

Other information

not available

Inventory data references

The vegetation modeled for this site has limited data and is considered provisional. The associated model was largely developed from NRCS staff with working knowledge of the area and literature review.

The narratives, tables, state-and-transition model, and dominant species are largely based on project concepts from the following soil surveys: Denali National Park Area, Alaska (Clark and Duffy 2006) and Matanuska-Susitna Valley Area, Alaska.

References

Clark, M.H. and M.S. Duffy. Soil Survey of Denali National Park Area, Alaska.. USDA NRCS.

Schoeneberger, P.J. and D.A. Wysocki. 2017. Geomorphic Description System, Version 5.0..

Smith, R.D., A.P. Ammann, C.C. Bartoldus, and M.M. Brinson. 1995. An approach for assessing wetland functions using hydrogeomorphic classification, reference wetlands, and functional indices.

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

Bailey, R.G. 1995. Ecoregions of North America. U.S. Department of Agriculture, Forest Service, Washington, DC, map scale 1: 15,000,000. Available at https://www.fs.fed.us/rm/ecoregions/products/map-ecoregions-north-america/.

Boggs, K.W., S.C. Klein, J.E. Grunblatt, G.P. Streveler, and B. Koltun. 2008. Landcover Classes and Plant Associations of Glacier Bay National Park and Preserve. Natural Resource Technical Report NPR/GLBA/NRTR-2008/093. National Park Service, Fort Collins, CO. 254 pps.

Boggs, K., S.C. Klein, J. Grunblatt, T. Boucher, B. Koltun, M. Sturdy, and G.P. Streveler. 2010. Alpine and subalpine vegetation chronosequences following deglaciation in coastal Alaska. Arctic, Antarctic, and Alpine Research 42: 385-395.

Boggs, K., L. Flagstad, T. Boucher, T. Kuo, M. Aisu, J. Tande, and J. Michaelson. 2016. Vegetation Map and Classification: Southern Alaska and Aleutian Islands. Alaska Natural Heritage Program, Alaska Center for Conservation Science, University of Alaska Anchorage. 90 pps.

Carsten, R. 2007. Chapter 5.2 Terrestrial habitats of Southeast Alaska. In: Schoen, J.W. and E. Dovichin (eds). The Coastal Forests and Mountains Ecoregion of Southeastern Alaska and the Tongass National Forest: A Conservation Assessment and Resource Synthesis. Audubon Alaska and The Nature Conservancy, Anchorage, AK.

Gallant, A.L., E.F. Binnian, J.M. Omernick, and M.B. Shasby. 2010. Level III Ecoregions of Alaska. Corvallis, OR, U.S. EPA, National Health and Environmental Effects Research Laboratory, map scale 1: 5,000,000. Available at http://http://www.epa.gov/eco-research//ecoregion-download-files-state-region-10. (Accessed 11 September 2018).

Kauffman, D.S., N.E. young, J.P. Briner, and W.F. Manley. 2011. Alaska Palaeo-Glacier Atlas (Version 2), pps. 427-445. In: Ehlers, J., P.L. Gibbard, and P.D. Hughes (eds.). Developments in Quaternary Science, Volume 15. Amsterdam, The Netherlands.

LANDFIRE. 2024. Biophysical Setting 16160 Western North American Boreal Riparian Stinger Forest and Shrubland. In: LANDFIRE National Vegetation Dynamics Models. USDA Forest Service and US Department of Interior. Washington, DC.

LANDFIRE. 2024. Biophysical Setting 16150 Western North American Boreal Lowland Large River Floodplain Forest and Shrubland. In: LANDFIRE National Vegetation Dynamics Models. USDA Forest Service and US Department of Interior. Washington, DC.

LANDFIRE. 2024. Biophysical Setting 16142 Western North American Boreal Montane Floodplain Forest and Shrubland - Boreal Transition. In: LANDFIRE National Vegetation Dynamics Models. USDA Forest Service and US Department of Interior. Washington, DC.

LANDFIRE. 2024. Biophysical Setting 16760 Alaskan Pacific Maritime Alpine Floodplain. In: LANDFIRE National Vegetation Dynamics Models. USDA Forest Service and US Department of Interior. Washington, DC.

LANDFIRE. 2024. Biophysical Setting 16550 Alaskan Pacific Maritime Floodplain Forest

and Shrubland. In: LANDFIRE National Vegetation Dynamics Models. USDA Forest Service and US Department of Interior. Washington, DC.

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1 NatureServe, Arlington, VA. Available at http://explorer.natureserve.org. (Accessed 10 September 2018).

Peel, M.C., B.L. Finlayson, and T.A. McMahon. 2007. Updated world map of the Köppen-Geiger climate classification. Hydrology and Earth System Sciences 11: 1633-1644.

United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS). 2006. 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. 682 pps.

Wahrhaftig, C. 1965. Physiographic Divisions of Alaska. Geological Survey Professional paper 482. U.S. Department of the Interior, Geological Survey, U.S. Government Printing Office, Washington, DC. 52 pps.

United States Department of Agriculture Staff. Hydrogeomorphic Wetland Classification System: An Overview and Modification to Better Meet the Needs of the Natural Resources Conservation Service. 2008

Contributors

Marji Patz
Blaine Spellman

Acknowledgments

The original site concepts for the Loamy slopes was created and published by Karin Sonnen, the State Grazing/Rangeland Management Specialist for Alaska in May of 2010.

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	01/22/2026
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:**
