

Ecological site F220XY440AK

Maritime Forest Loamy Plains

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 220X–Alexander Archipelago-Gulf of Alaska Coast

The Alexander Archipelago-Gulf of Alaska Coast area consists of a narrow arc of islands and lower elevation coastal mountains in the Southern Alaska Region. This area spans from the Alexander Archipelago in southeastern Alaska, north and west along the coast of the Gulf of Alaska and Prince William Sound, and further west to the southern tip of the Kenai Peninsula and the northeastern islands of the Kodiak Archipelago. The area makes up about 27,435 square miles (USDA 2006). The terrain primarily consists of low to moderate relief mountains that are deeply incised. Throughout the area glaciers, rivers, and streams have cut deep, narrow to broad valleys. The broader valleys have nearly level to strongly sloping flood plains and stream terraces. Alluvial and colluvial fans and short footslopes are common in the valleys along the base of the mountains. Rocky headlands, sea cliffs, estuaries, and beaches are common along the coast. This area includes the Municipality of Juneau, Alaska's capital, and a number of smaller coastal towns and villages. Federally administered lands within this MLRA include Admiralty Island National Monument and part of Misty Fjords National Monument, Tongass National Forest, Chugach National Forest, and Glacier Bay, Wrangell-St. Elias, and Kenai Fjords National Parks and Preserves. The southern terminus of the Trans-Alaska Pipeline is in Valdez. During the late Pleistocene epoch, the entire area was covered with glacial ice. The numerous fjords of the Alexander Archipelago and Prince William Sound were formed chiefly as a result of glacial scouring and deepening of preglacial river valleys. Most glacial deposits have been eroded away or buried by mountain colluvium and alluvium, which cover about 90 percent of the present landscape. The remaining glacial and glaciofluvial deposits are generally restricted to coastal areas. During the Holocene epoch, volcanic activity within and adjacent to this area deposited a layer of volcanic ash of varying thickness on much of the landscape in the southeastern and northwestern parts of the area. Paleozoic, Mesozoic, and Lower Tertiary stratified sedimentary rocks and Cretaceous and Tertiary intrusive rocks underlie much of the area and are exposed on steep mountain slopes and ridges (USDA 2006). The dominant soil orders in this MLRA are Spodosols, Histosols, and Entisols. Soils in the area typically have a cryic soil temperature regime, an udic moisture regime, and have mixed mineralogy. Spodosols are common on mountains and hills having been formed in gravelly or cobbly colluvium, glacial till, and varying amounts of silty volcanic ash. These Spodosols commonly range from shallow to deep, are well to somewhat poorly drained, and typically classify as Humicryods or Haplocryods. Histosols that are poorly to very poorly drained occur on footslopes, discharge slopes, and valley floors. These wet histosols commonly classify as Cryosaprists, Cryohemists, and Cryofibrists. Histosols that are well drained occur on steep mountainsides. These dry Histosols commonly classify as Cryofolists. Entisols are common on flood plains, stream terraces, and outwash plains having been formed in silty, sandy, and gravelly to cobbly alluvium. These Entisols are generally deep, range from well to somewhat poorly drained, and commonly classify as Cryaquents and Cryofluvents. Miscellaneous (non-soil) areas make up about 23 percent of the MLRA. The most common miscellaneous areas are avalanche chutes, rock outcrop, rubble land, beaches, river wash, and water. This area represents the northern extent of the Pacific temperate rainforest and is characterized by productive stands of conifers. Western hemlock and Sitka spruce are the dominant trees on mountains and hills at the lower elevations. Due to warmer temperatures, western red cedar and Alaska cedar are more prevalent in the southern part of the area. Black cottonwood and mixed forest types occur on flood plains. Areas of peat and other sites that are too wet for forest growth support sedge-grass meadows and low scrub. The transition to subalpine and alpine communities typically occurs at elevations between 1500 to 3000 feet (Boggs et al. 2010, Carstensen 2007, Martin et al. 1995), which characterize the vegetation of the Southern Alaska Coastal Mountains area. For many decades, logging, commercial fishing, and mining have been the primary industrial land uses throughout much of the area. In recent years, changes in public interests, land use policies, and timber economics have contributed to a significant decline in the timber industry. Commercial fishing continues to be an important industry and most communities support a fleet of boats and fishing related facilities. A number of mines operate in the area and others have been prospected and proposed. Tourism and wildland recreation are becoming increasingly important. Subsistence hunting, fishing, and gathering provide food and a variety of other resources to local residents and remain the principal economy for residents of remote villages.

Ecological site concept

This site occurs on glaciated till plains on convex positions of the Outer Coast area of Glacier Bay National Park and preserve. The primary driver for this ecological site is shallow depth to lithic material, which restricts root growth and development. In areas where the lithic material is broken, increased root development and increased tree growth occurs. Associated soils for this site are well drained residuum derived from graywacke, resulting in sandy loam textures. Ponding and flooding is not known to occur on this site. Slopes range from 0-10% and elevations range from sea level to 230 feet. The reference community phase is characterized as an open needleleaf forest community comprised of stunted mixed conifers, including Alaska cedar, mountain hemlock, and lodgepole pine (Viereck et al. 1992). The understory consists of numerous ericaceous shrubs, forbs, and moss. Common species include crowberry, Aleutian mountainheath, bog blueberry, deercabbage, Sphagnum and Schreber's big red stem moss.

Associated sites

R220XY434AK	Maritime Scrubland Peat Plain Depression In areas where these ecological sites abut, ecotonal plant communities that have characteristics from each ecological site are common.
F220XY441AK	Maritime Forest Gravelly Slopes In areas where these ecological sites abut, ecotonal plant communities that have characteristics from each ecological site are common.

Similar sites

F220XY439AK	Maritime Stunted Woodland Shallow Organic Slopes Ecological site F220XY439AK can exhibit similar species assemblages to those of ecological site F220XY440AK, but site F220XY439AK has very poor to poorly drained soils, occurs on convexities on lower third backslopes, and does not support Alaska cedar in the reference community phase.
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Table 1. Dominant plant species

Tree	(1) <i>Callitropsis nootkatensis</i> (2) <i>Tsuga mertensiana</i>
Shrub	(1) <i>Empetrum nigrum</i> (2) <i>Phyllodoce aleutica</i>
Herbaceous	(1) <i>Hylocomium splendens</i> (2) <i>Sphagnum</i>

Physiographic features

This site occurs on glaciated till plains associated with coastal mountains. Ponding and flooding does not occur on this site, and soils are well-drained and shallow to lithic contact. Slopes range from 0-10% and elevations range from sea level to 230 feet.

Table 2. Representative physiographic features

Slope shape across	(1) Convex (2) Linear
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Slope shape up-down	(1) Convex (2) Linear
Landforms	(1) Till plain > Till plain (2) Mountains > Mountain slope
Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	0 – 70 m
Slope	0 – 10 %
Water table depth	150 – 0 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	0 – 180 m
Slope	0 – 20 %
Water table depth	150 – 0 cm

Climatic features

Cloudy skies, moderate temperatures, and abundant rainfall characterize the temperate maritime climate of this site. Frequent winter storms may consist of snow or heavy rainfall. Moderate to strong winds from the south and southeast are common before and during storms throughout the year. Annual precipitation ranges from 44-94 inches, and annual snowfall ranges from 30-70 inches along the coast and up to 200 inches at higher elevations (USDA 2006). The average annual temperature at lower elevations ranges from about 38-43 degrees F (3-6 degrees C). The frost-free period ranges from about 90-140 days, and the freeze-free period ranges from about

125-180 days.

Table 4 Representative climatic features

Frost-free period (characteristic range)	100-140 days
Freeze-free period (characteristic range)	150-180 days
Precipitation total (characteristic range)	1,400-3,680 mm
Frost-free period (actual range)	80-170 days
Freeze-free period (actual range)	120-220 days
Precipitation total (actual range)	890-4,370 mm
Frost-free period (average)	120 days
Freeze-free period (average)	170 days
Precipitation total (average)	2,460 mm

- (1) GUSTAVUS [USW00025322], Gustavus, AK
- (2) GLACIER BAY [USC00503294], Gustavus, AK
- (3) YAKUTAT STATE AP [USW00025339], Yakutat, AK
- (4) SKAGWAY AP [USW00025335], Skagway, AK
- (5) HAINES AP [USW00025323], Haines, AK
- (6) SELDOVIA AP [USW00025516], Homer, AK
- (7) MAIN BAY [USC00505604], Valdez, AK
- (8) CORDOVA M K SMITH AP [USW00026410], Cordova, AK
- (9) SITKA AIRPORT [USW00025333], Sitka, AK
- (10) JUNEAU INTL AP [USW00025309], Juneau, AK
- (11) ANNETTE ISLAND AP [USW00025308], Metlakatla, AK
- (12) PETERSBURG 1 [USW00025329], Petersburg, AK
- (13) KETCHIKAN INTL AP [USW00025325], Ketchikan, AK
- (14) PELICAN [USC00507141], Hoonah, AK

Influencing water features

Due to it's landscape position, this site is not influenced by streams or wetlands.

Soil features

The soils of this site are primarily formed in residuum derived from graywacke material in convex positions. These soils are shallow to lithic contact and are well-drained. Textures are loamy to loamy-skeletal and no flooding or ponding occurs. These shallow soils limit vegetative growth and are a primary driver of this site. The soil moisture regime is udic.

Figure 7. Typical soil profile for Annoksek soils in Glacier Bay National Park and Preserve-Gustavus Area, Alaska.

Table 5. Representative soil features

Parent material	(1) Residuum – graywacke (2) Residuum – sedimentary rock (3) Colluvium – metamorphic rock
Surface texture	(1) Gravelly sandy loam (2) Silt loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	30 – 50 cm
Soil depth	30 – 50 cm
Surface fragment cover ≤3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-25.4cm)	1.52 – 1.78 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Clay content (0-50.8cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified

Soil reaction (1:1 water) (0-25.4cm)	4.3 – 5.4
Subsurface fragment volume <=3" (0-152.4cm)	10 %
Subsurface fragment volume >3" (0-152.4cm)	Not specified

Table 6. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	30 – 150 cm
Soil depth	30 – 150 cm
Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %
Available water capacity (0-25.4cm)	1.52 – 1.78 cm
Calcium carbonate equivalent (0-101.6cm)	0 %
Clay content (0-50.8cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	0 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-25.4cm)	3.5 – 7.3
Subsurface fragment volume <=3" (0-152.4cm)	10 – 60 %
Subsurface fragment volume >3" (0-152.4cm)	0 – 30 %

Ecological dynamics

This site is associated with glaciated till plains in the coastal mountains along the Gulf of Alaska. Until about 10,000 years ago, this area had many large continental-scale glacial ice sheets that advanced and retreated many times over the millennia (Chapin 1994). In Glacier Bay, glaciers reached maximum extent about 1750 AD when the glaciers terminated into the Icy Strait (Hall et al. 1994). Since then, glaciers of Glacier Bay have thinned and retreated nearly 65 miles up the bay. Numerous tidewater glaciers still exist in this area, including Johns Hopkins Glacier, Grand Pacific Glacier, Lamplugh Glacier, McBride Glacier, and Muir Glacier (Lawson 2015). The 250-year glacial retreat is attributed to less regional snowfall in the mountains, rising winter temperatures, and decreased cloud cover and lower precipitation during the growing season in summer (Hall et al. 2003).

Although the Outer Coast area historically was glaciated, it was not glaciated during the Little Ice Age and thus is an older landscape than Glacier Bay Inlet. The soils in the Outer Coast areas have experienced more weathering and are more developed. Glacier Bay receives a large amount of precipitation from the Gulf of Alaska. The numerous rock outcroppings and shallow depth to bedrock are convex geomorphic features on the glaciated plains. These areas support unique community assemblages.

This site is associated with convex positions on glaciated till plains. Flooding is not known to occur on these landforms and soils are well-drained. Shallow soils with lithic contact are a primary driver of the reference phase on this site. Windthrow has been observed for this site, which uproots weakly rooted trees atop the shallow bedrock and does not result in a unique post-disturbance community. Slight browsing by Sitka deer (*Odocoileus hemionus sitkensis*) on shrubs and graminoids has been recorded, but it does not alter the composition of the reference plant community.

State and transition model

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
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Table 9. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
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Inventory data references

NASIS ID Plant Community 13NP00203 community 1.1 13NP00301 community 1.1 13TD00202 community 1.1 14NP01102 community 1.1

Other references

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Contributors

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Approval

Blaine Spellman, 6/05/2025

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	06/05/2025
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

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

5. Number of gullies and erosion associated with gullies:

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

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

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):

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:
