

Ecological site F220XY427AK

Maritime Forest Gravelly High Floodplain

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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 minerology. 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 in river valleys and coastal plains on high flood plains adjacent to a river or stream channel. These high flood plains are rarely to frequently flooded, and may include some closed depressions where water ponds on the surface for long durations. Soil textures are stratified silt loams to loamy sands, often with lenses of gravel and sandier textures in deeper soil horizons. Relatively small, closed depressions occur on these high flood plains and often have very deep peat deposits as a result of long duration ponding. Drainage class ranges from moderately well- to well-drained, with very poor drainage in closed depressions. This site supports a reference state composed of three communities that reflect a disturbance regime of high-intensity flooding. A tall shrub community with abundant herbaceous understory plants is typical following severe flood events. In the absence of severe flooding, the abundance of balsam poplar trees increases, and the community resembles an open forest. If flooding becomes even less frequent, Sitka spruce becomes dominant, and understory shrubs and forbs are largely displaced by moss species.

Associated sites

R220XY426AK	Maritime Shrub Low Flood Plain R220XY426AK occurs downslope of this site on low flood plain positions that have more frequent and longer duration flood events.
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Similar sites

R220XY426AK	Maritime Shrub Low Flood Plain Both sites occur on floodplains of rivers and streams, however, site R220XY426AK does not support tree dominance because it occurs on low flood plains with high flood frequency. By contrast, this site occurs on high flood plains and experiences less frequent flooding that enables trees to dominate over time.
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Table 1. Dominant plant species

Tree	(1) <i>Picea sitchensis</i>
Shrub	(1) <i>Vaccinium ovalifolium</i>
Herbaceous	(1) <i>Orthilia secunda</i> (2) <i>Hylocomium splendens</i>

Physiographic features

This site occurs in river valleys and coastal plains on high flood plains associated with river and stream channels. These high flood plains are rarely to occasionally flooded. Closed depression microfeatures pond for long durations. The water table is usually more than 72 inches below the soil surface, but can rise to within 18 inches of the surface during wet periods. In ponded depressions, the water table is at or above the soil surface for long periods. Slopes typically range from 0-3% with elevations typically between sea level and 425 feet.

Table 2. Representative physiographic features

Landforms	(1) River valley > Flood plain (2) Coastal plain > Flood plain (3) River valley > Flood plain > Closed depression (4) Coastal plain > Flood plain > Closed depression
Runoff class	Medium

Flooding duration	Brief (2 to 7 days)
Flooding frequency	Rare to occasional
Ponding duration	Long (7 to 30 days)
Ponding frequency	None
Elevation	0 – 130 m
Slope	0 %
Water table depth	50 – 150 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Medium
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Very rare to frequent
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	0 – 560 m
Slope	0 – 20 %
Water table depth	0 – 150 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

The hydrology of this site is characterized by rare to occasional freshwater flooding during spring runoff and other large storm events. In the event that high-intensity flooding removes vegetation on this site, which occurs less frequently than on the adjacent low flood plain site, the result is several years to decades of alder and willow cover followed by a gradual increase in tree cover. Closed depressions on the flood plain are frequently ponded for long durations.

Soil features

The soils of this site formed in deep alluvial deposits on high flood plains by freshwater rivers and streams. Soil textures are stratified silt loams to loamy sands, often with lenses of gravel and sandier textures in deeper soil horizons. A thin organic layer is common on the soil surface. Relatively small, closed depressions occur on these high flood plains, and often have very deep peat deposits as a result of long duration ponding. These soils are typically moderately well- and well-drained, with very poor drainage in closed depressions. The soil moisture regime of this site is udic or oxyaquic except in depressions, which are aquic.

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

Table 5. Representative soil features

Parent material	(1) Alluvium (2) Organic material
Surface texture	(1) Loamy sand (2) Silt loam (3) Sandy loam (4) Gravelly sand (5) Peat
Family particle size	(1) Coarse-loamy over sandy or sandy-skeletal (2) Sandy (3) Ashy over sandy or sandy-skeletal (4) Sandy-skeletal
Drainage class	Moderately well drained to well drained
Permeability class	Moderately rapid to rapid
Depth to restrictive layer	150 cm
Soil depth	150 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-25.4cm)	0.51 – 6.86 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified

Clay content (0-50.8cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 7.3
Subsurface fragment volume <=3" (0-152.4cm)	0 – 50 %
Subsurface fragment volume >3" (0-152.4cm)	0 – 20 %

Table 6. Representative soil features (actual values)

Drainage class	Very poorly drained to well drained
Permeability class	Moderately rapid to very rapid
Depth to restrictive layer	150 cm
Soil depth	150 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-25.4cm)	0.25 – 12.19 cm

Calcium carbonate equivalent (0-101.6cm)	0 %
Clay content (0-50.8cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	3.5 – 8.4
Subsurface fragment volume ≤3" (0-152.4cm)	0 – 70 %
Subsurface fragment volume >3" (0-152.4cm)	0 – 50 %

Ecological dynamics

This site is associated with flood plains of large rivers and tributaries along the Gulf of Alaska. Until about 10,000 years ago, this area had many continental-scale ice sheets that advanced and retreated many times over millennia (Chapin 1994). The final advance of these glaciers occurred during the Little Ice Age, which peaked about 1750 AD. Since then, many glaciers have thinned and retreated inland, while numerous tidewater glaciers still exist in the area (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).

During the past 250 years of glacial retreat, meltwater transported and deposited a large amount of silt and sediment via numerous short, high-gradient rivers. Alluvial and colluvial fans and long footslopes are common in the valleys along the base of the mountains. The flood plains in this area are generally broad and braided with a high gradient, and feed into the tidally influenced estuarine areas.

This site supports a reference state composed of three communities that are each impacted by a flood regime. A tall shrub community with abundant herbaceous understory plants typically occurs following severe flood events. In the absence of severe flooding, tree seedling establish and grow. The abundance of balsam poplar trees increases, and the community resembles an open forest. With enough time and a lack of severe flood events, Sitka spruce becomes dominant and understory shrubs and forbs are largely displaced by moss species.

Browsing by moose on willow species was observed on this ecological site, but it does not appear to affect the ecological processes enough to alter the communities.

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)
Tree							
Sitka spruce	PISI	<i>Picea sitchensis</i>	Native	11.6-28.3	40-65	14.5-46.2	–
western hemlock	TSHE	<i>Tsuga heterophylla</i>	Native	–	0-15	–	–

Table 9. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Forb/Herb					
sidebells wintergreen	ORSE	<i>Orthilia secunda</i>	Native	–	3-4
wintergreen	PYROL	<i>Pyrola</i>	Native	–	0-4
claspleaf twistedstalk	STAM2	<i>Streptopus amplexifolius</i>	Native	–	0-3
bride's feathers	ARDI8	<i>Aruncus dioicus</i>	Native	–	0-2
Fern/fern ally					
clubmoss	LYCOP2	<i>Lycopodium</i>	Native	–	0-3
spreading woodfern	DREX2	<i>Dryopteris expansa</i>	Native	–	0-1
Shrub/Subshrub					
oval-leaf blueberry	VAOV	<i>Vaccinium ovalifolium</i>	Native	–	0-15
salmonberry	RUSP	<i>Rubus spectabilis</i>	Native	–	0-4
Sitka alder	ALVIS	<i>Alnus viridis ssp. sinuata</i>	Native	–	0-1
Tree					
balsam poplar	POBA2	<i>Populus balsamifera</i>	Native	–	0-1
Nonvascular					
Schreber's big red stem moss	PLSC70	<i>Pleurozium schreberi</i>	Native	–	40-45
splendid feather moss	HYSP70	<i>Hylocomium splendens</i>	Native	–	35-40
dicranum moss	DICRA8	<i>Dicranum</i>	Native	–	1-5
rhizomnium moss	RHGL70	<i>Rhizomnium glabrescens</i>	Native	–	0-5

Table 10. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 1.2 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
balsam poplar	POBA2	<i>Populus balsamifera</i>	Native	–	15-25	–	–
Sitka spruce	PISI	<i>Picea sitchensis</i>	Native	–	0-5	–	–

Table 12. Community 1.2 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Forb/Herb					
bride's feathers	ARDI8	<i>Aruncus dioicus</i>	Native	–	0-15
wintergreen	PYROL	<i>Pyrola</i>	Native	–	0-7
sweetroot	OSMOR	<i>Osmorhiza</i>	Native	–	0-5
violet	VIOLA	<i>Viola</i>	Native	–	0-3

common cowparsnip	HEMA80	<i>Heracleum maximum</i>	Native	–	0-3
aster	ASTER	<i>Aster</i>	Native	–	0-3
fragrant bedstraw	GATR3	<i>Galium triflorum</i>	Native	–	0-3
largeleaf avens	GEMA4	<i>Geum macrophyllum</i>	Native	–	1-2
buttercup	RANUN	<i>Ranunculus</i>	Native	–	0-2
Menzies' burnet	SAME6	<i>Sanguisorba menziesii</i>	Native	–	0-2
claspleaf twistedstalk	STAM2	<i>Streptopus amplexifolius</i>	Native	–	0-1
northern green orchid	PLHY2	<i>Platanthera hyperborea</i>	Native	–	0-1
western rattlesnakeroot	PRAL	<i>Prenanthes alata</i>	Native	–	0-1
woodland buttercup	RAUN	<i>Ranunculus uncinatus</i>	Native	–	0-1
narcissus anemone	ANNA	<i>Anemone narcissiflora</i>	Native	–	0-1
sweetcicely	OSBE	<i>Osmorhiza berteroi</i>	Native	–	0-1
red baneberry	ACRU2	<i>Actaea rubra</i>	Native	–	0-1
northern groundcone	BORO	<i>Boschniakia rossica</i>	Native	–	0-1
Fern/fern ally					
field horsetail	EQAR	<i>Equisetum arvense</i>	Native	–	1-2
variegated scouringrush	EQVA	<i>Equisetum variegatum</i>	Native	–	0-2
Shrub/Subshrub					
Sitka alder	ALVIS	<i>Alnus viridis ssp. sinuata</i>	Native	–	10-35
salmonberry	RUSP	<i>Rubus spectabilis</i>	Native	–	0-5
Sitka willow	SASI2	<i>Salix sitchensis</i>	Native	–	0-3
devilsclub	OPHO	<i>Oplopanax horridus</i>	Native	–	1-3
squashberry	VIDE	<i>Viburnum edule</i>	Native	–	0-1
blackberry	RUBUS	<i>Rubus</i>	Native	–	0-1
Nonvascular					
Schreber's big red stem moss	PLSC70	<i>Pleurozium schreberi</i>	Native	–	0-5
goose neck moss	RHYTI2	<i>Rhytidiadelphus</i>	Native	–	0-2

Table 13. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 1.3 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
American dunegrass	LEMO8	<i>Leymus mollis</i>	Native	–	0-10
Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	Native	–	0-2
Forb/Herb					
field horsetail	EQAR	<i>Equisetum arvense</i>	Native	–	2-40
largeleaf avens	GEMA4	<i>Geum macrophyllum</i>	Native	–	0-25
seacoast angelica	ANLU	<i>Angelica lucida</i>	Native	–	0-8
calliergon moss	CALLI10	<i>Calliergon</i>	Native	–	0-5
bushy knotweed	PORA3	<i>Polygonum ramosissimum</i>	Native	–	0-5
liverleaf wintergreen	PYAS	<i>Pyrola asarifolia</i>	Native	–	0-5
common cowparsnip	HEMA80	<i>Heracleum maximum</i>	Native	–	0-3
aster	ASTER	<i>Aster</i>	Native	–	0-3
Shrub/Subshrub					
Sitka alder	ALVIS	<i>Alnus viridis ssp. sinuata</i>	Native	–	30-70

Sitka willow	SASI2	<i>Salix sitchensis</i>	Native	–	10-15
salmonberry	RUSP	<i>Rubus spectabilis</i>	Native	–	0-5
devilsclub	OPHO	<i>Oplopanax horridus</i>	Native	–	0-5
Tree					
Sitka spruce	PISI	<i>Picea sitchensis</i>	Native	–	0-3
Nonvascular					
polytrichum moss	POLYT5	<i>Polytrichum</i>	Native	–	0-25
Moss	2MOSS	<i>Moss</i>	Native	–	0-10
snow lichen	STERE2	<i>Stereocaulon</i>	Native	–	0-1

Inventory data references

All data currently reside in NASIS under the User Site IDs in the following table: NASIS ID / community 13TD00402 /community 1.1 13TD06802 / community 1.1 13TD00404 / community 1.3 13NP00801 / community 1.3 13NP00802 / community 1.2 13NP02503 / community 1.2 13NP03202 / community 1.3

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Approval

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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	03/13/2025
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:
