Ecological site F220XY442AK
Maritime Forest Loamy Steep Slopes

Last updated: 3/10/2025
Accessed: 05/11/2025

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 temperature 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 mountain slopes and hillslopes associated with upland, coastal mountains around the Gulf of Alaska. The site is dominantly in the Outer Coast and Excursion Inlet areas of Glacier Bay National Park and Preserve. These areas were not glaciated during the Little Ice Age, a phenomenon associated with Glacier Bay Inlet. Flooding and ponding are not known to occur on this site, but a water table during part or all of the growing season as shallow as 10 inches can influence the plant community. Soil textures are loamy to coarse-loamy and soils are somewhat poorly to moderately well drained.

The reference plant community phase is characterized as an open needleleaf forest. It is composed of mixed conifers, including mountain hemlock (Tsuga mertensiana), Alaska cedar (Callitropsis nootkatensis), western hemlock (Tsuga heterophylla), and Sitka spruce (Picea Sitchensis). Common understory species include oval-leaf blueberry (Vaccinium ovalifolium), rusty menziesia (Menziesia ferruginea), copperbush (Elliottia pyroliflora), fernleaf goldthread (Coptis aspleniifolia), stairstep moss (Hylocomium splendens), Sphagnum (Sphagnum spp.), and Schreber's big red stem moss (Pleurozium schreberi).

Associated sites

F220XY441AK	**Maritime Forest Gravelly Slopes** Ecological site F220XY441AK occurs on mountain backslopes with less slope (10 to 45 percent) with linear slope shape.
F220XY447AK	**Maritime Forest Loamy Organic Slopes** Ecological site F220XY447AK occurs on mountain backslopes with concave slope shape.

Similar sites

F220XY468AK	**Maritime Forest Loamy Slopes Warm** Ecological site F220XY468AK supports a similar ecological community and disturbance regime on loamy slopes but is associated with a southwest aspect.

Table 1. Dominant plant species

Tree	(1) *Tsuga mertensiana* (2) *Callitropsis nootkatensis*
Shrub	(1) *Vaccinium ovalifolium* (2) *Menziesia ferruginea*
Herbaceous	(1) *Hylocomium splendens* (2) *Sphagnum*

Physiographic features

This site occurs on strongly sloped to steep mountain slopes on upland, coastal mountains. These landscape positions are not flooded or ponded, but a shallow year-round water table is present on this site. Slopes range from 5-60%, and elevations occur from sea level to 800 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Mountains > Mountain valley (3) Hills > Hillslope (4) Coastal plain > Moraine
Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	0–800 ft
Slope	5–60%
Water table depth	10–20 in
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Medium
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	0–1,000 ft
Slope	5–80%
Water table depth	0–60 in

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)	95-142 days
Freeze-free period (characteristic range)	147-183 days
Precipitation total (characteristic range)	55-145 in
Frost-free period (actual range)	84-170 days
Freeze-free period (actual range)	119-218 days
Precipitation total (actual range)	35-172 in
Frost-free period (average)	120 days
Freeze-free period (average)	168 days
Precipitation total (average)	97 in

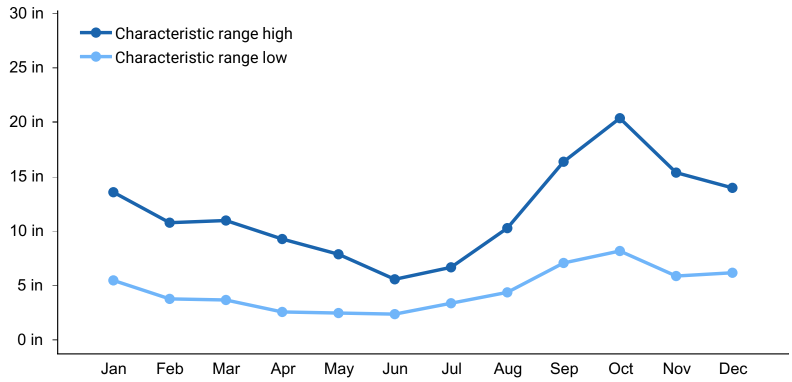


Figure 1. Monthly precipitation range

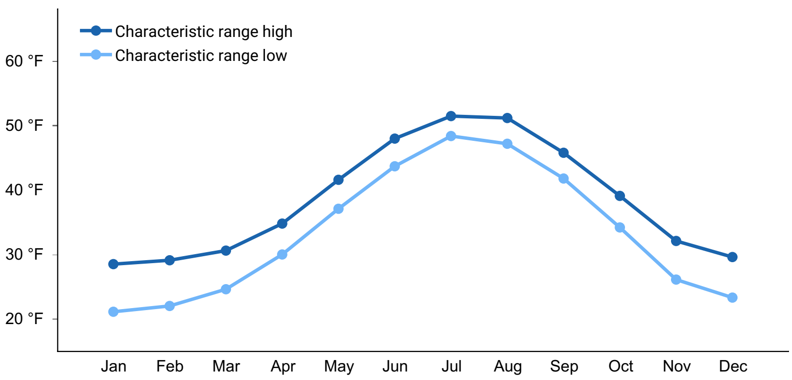


Figure 2. Monthly minimum temperature range

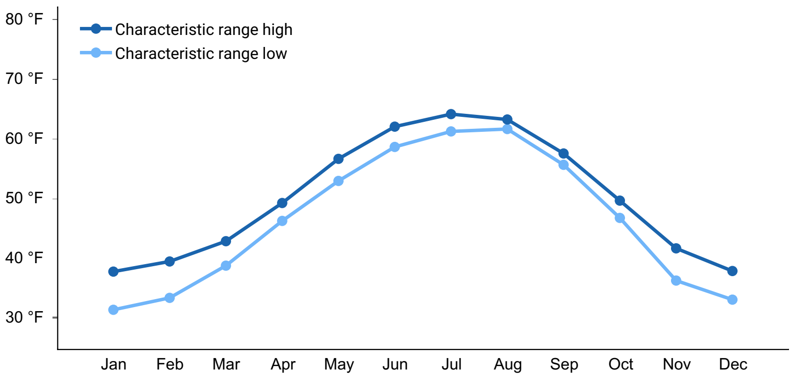


Figure 3. Monthly maximum temperature range

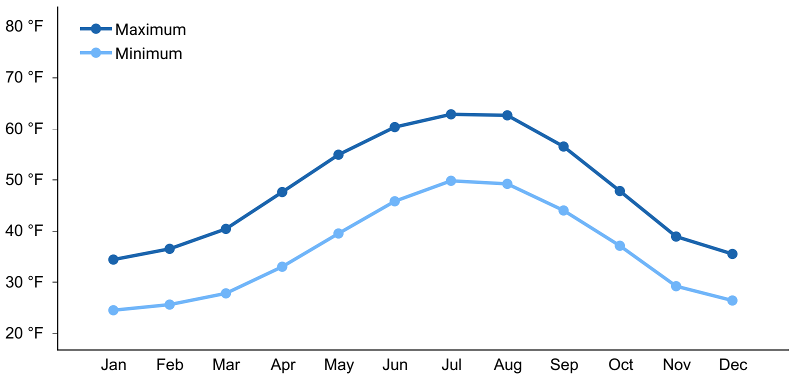


Figure 4. Monthly average minimum and maximum temperature

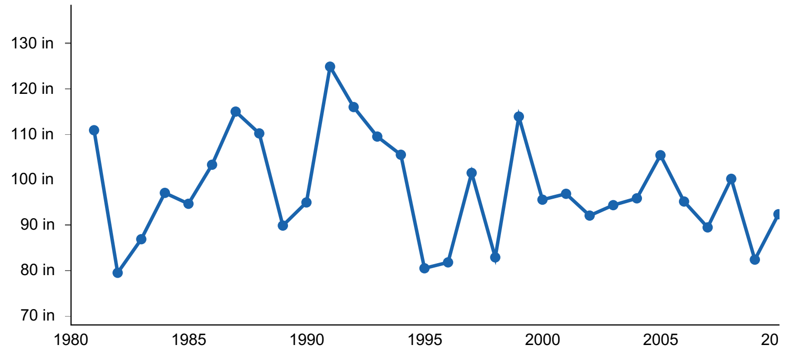


Figure 5. Annual precipitation pattern

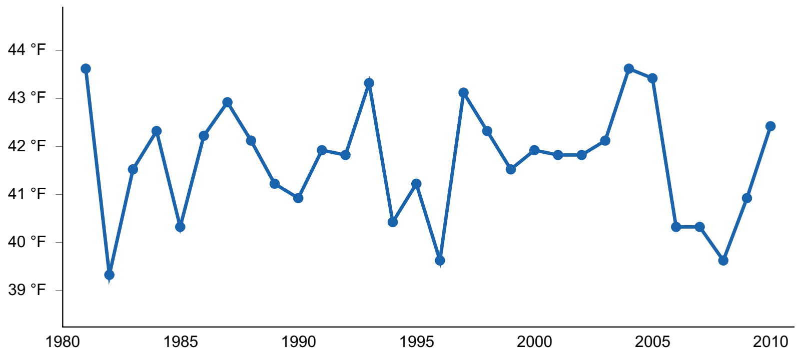


Figure 6. Annual average temperature pattern

Climate stations used

- (1) 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

This site is influenced year-round by a shallow water table that can influence the plant community, but is not influenced by wetlands or streams due to its landscape position.

Soil features

The soils of this site formed in moderately-deep till and organic material on mountain and hillslopes in coastal mountain ranges. Soil textures are loamy to coarse-loamy and are somewhat poorly- to moderately well-drained. The soil moisture regime is aquic udic and a shallow, year-round water table is associated with this site.

Figure 7. Typical soil profile associated with Boussole soils in Glacier Bay National Park and Preserve-Gustavus Area, Alaska.

Figure 8. Typical soil profile associated with Wachusett soils in Glacier Bay National Park and Preserve-Gustavus Area, Alaska.

Table 5. Representative soil features

Parent material	(1) Ablation till (2) Organic material (3) Residuum (4) Colluvium (5) Glaciofluvial deposits
Surface texture	(1) Silt loam (2) Loam (3) Sandy loam (4) Gravelly sandy loam (5) Mucky
Family particle size	(1) Coarse-loamy (2) Loamy
Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Moderate
Depth to restrictive layer	60–0 in
Soil depth	60–0 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	1.3–2 in

Calcium carbonate equivalent (0-40in)	0%
Clay content (0-20in)	4–10%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-10in)	4–7.5
Subsurface fragment volume <=3" (0-60in)	0%
Subsurface fragment volume >3" (0-60in)	0%

Table 6. Representative soil features (actual values)

Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Moderate
Depth to restrictive layer	60–0 in
Soil depth	60–0 in
Surface fragment cover <=3"	0–33%
Surface fragment cover >3"	0–5%
Available water capacity (0-10in)	0.5–2 in
Calcium carbonate equivalent (0-40in)	0%
Clay content (0-20in)	2–22%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-10in)	3.2–7.5
Subsurface fragment volume <=3" (0-60in)	0–33%
Subsurface fragment volume >3" (0-60in)	0–13%

Ecological dynamics

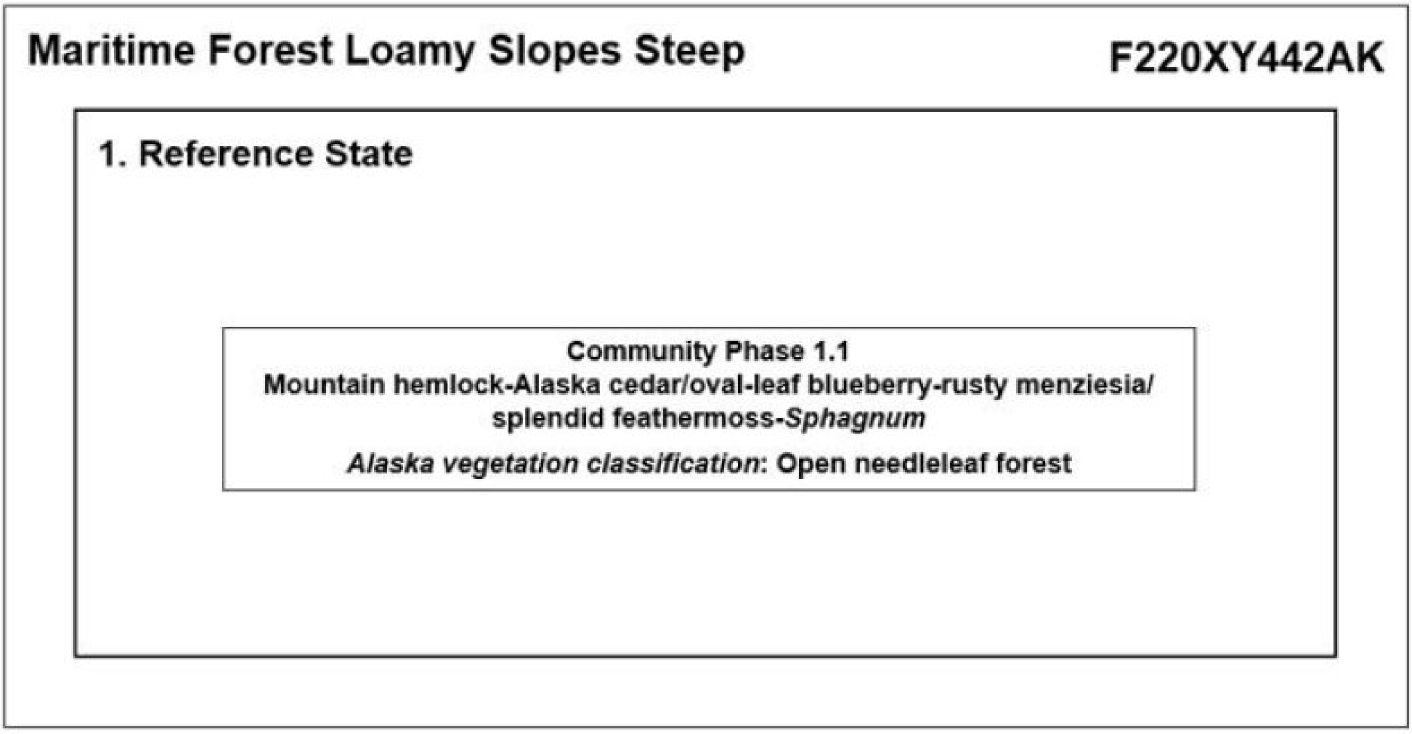
This site is associated with mountain slopes and hillslopes in coastal mountains around the Gulf of Alaska. Until about 10,000 years ago, this area had many large continental-scale glacial ice sheets that advanced and retreated many times over the millennia (Chapin 1994). In Glacier Bay, glaciers reached 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).

This ecological site is associated with the Outer Coast and Excursion Inlet, which are older landscapes within

Glacier Bay National Park and Preserve. Although the Outer Coast and Excursion Inlet areas were historically glaciated, they were not glaciated during the Little Ice Age and thus are older landscapes than those of Glacier Bay Inlet. Mountain backslopes are associated with these older landscapes and are very common along the Outer Coast and Excursion Inlet. Flooding and ponding are not known to occur on these sites, however, a shallow, year-round water table likely influences vegetation dynamics on this site. Soils are loamy to coarse-loamy, somewhat poorly- to moderately well-drained, and occur on slopes of 5-60 from sea level to 1,000 feet.

Occasionally, a broad regional decline in Alaska cedar occurs. This has been coined “yellow-cedar decline.” Vegetation patterns on this site illustrate this decline in certain areas. The theory suggests that yellow-cedar decline began about 1880, coinciding with the warming of the climate following the Little Ice Age (Hennon et al. 1994). It is believed that increased regional temperatures and the associated reduction in the depth and duration of snowpack exposed soils to cooler temperatures. This subsequently led to freezing of roots and eventually to larger scale mortality. Alaska yellow cedar is significantly less tolerant of cold than are other species, such as western hemlock. (Hennon et al. 2006). Yellow-cedar decline illustrates the variable characteristics resulting from the die-off of the overstory. The reference state on this site represents a single community phase and is characterized by an open needleleaf forest composed primarily of mountain hemlock, Alaska cedar, western hemlock and some Sitka spruce.

State and transition model



State 1
Reference State

The reference state supports one community phase and is represented by an open needleleaf forest. The presence of these and related communities is dictated temporally and spatially by a shallow water table. All community phases in this report are characterized using the Alaska Vegetation Classification System (Viereck et al. 1992).

Resilience management. This state has been observed to be resilient and/or resistant to current disturbance drivers, lacking alternative states and at-risk communities.

Dominant plant species

- mountain hemlock (*Tsuga mertensiana*), tree
- Alaska cedar (*Callitropsis nootkatensis*), tree
- oval-leaf blueberry (*Vaccinium ovalifolium*), shrub
- rusty menziesia (*Menziesia ferruginea*), shrub
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Community 1.1
Mountain hemlock - Alaska cedar / oval-leaf blueberry - rusty menziesia / splendid feathermoss -Sphagnum

Figure 9. Typical plant community associated with community 1.1.

The reference community phase is characterized as an open needleleaf forest and is comprised primarily of mature mountain hemlock and Alaska cedar in the overstory but also includes Sitka spruce and western hemlock. No other community phases or state have been observed on this site.

Dominant plant species

- Alaska cedar (*Callitropsis nootkatensis*), tree
- mountain hemlock (*Tsuga mertensiana*), tree
- western hemlock (*Tsuga heterophylla*), tree
- Sitka spruce (*Picea sitchensis*), tree
- oval-leaf blueberry (*Vaccinium ovalifolium*), shrub
- rusty menziesia (*Menziesia ferruginea*), shrub
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Table 7. Soil surface cover

Tree basal cover	7-100%
Shrub/vine/liana basal cover	0-65%
Grass/grasslike basal cover	0-5%
Forb basal cover	0-75%
Non-vascular plants	10-100%

Biological crusts	0%
Litter	10-40%
Surface fragments >0.25" and <=3"	0-1%
Surface fragments >3"	0%
Bedrock	0-1%
Water	0%
Bare ground	0%

Additional community tables

Table 8. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)

Table 9. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)

Inventory data references

NASIS ID Plant Community
14NP01202 Community 1.1
14NP01501 Community 1.1
14JP01102 Community 1.1
13TD00801 Community 1.1
13NP01005 Community 1.1
2015AK105002 Community 1.1
2015AK105122 Community 1.1
14NP01001 Community 1.1
14NP01002 Community 1.1
14JP00802 Community 1.1
14JP00803 Community 1.1
14JP00804 Community 1.1
14JP00902 Community 1.1
14JP00903 Community 1.1
14JP01802 Community 1.1
14JP01803 Community 1.1

Other references

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Contributors

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Approval

Marji Patz, 3/10/2025

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	05/11/2025
Approved by	Marji Patz
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:**