Ecological site F220XY439AK
Maritime Stunted Woodland Shallow Organic 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 muskegs on mountain slopes of 25 to 50%. Soil parent material is organic matter over residuum and glacial till. Soils are shallow, with bedrock occurring within 20 inches. A shallow water table persists and influences plant community dynamics through much of the growing season, but flooding and ponding does not occur.

This site supports a reference state comprised of a single plant community phase that is characterized as a dwarf tree scrub woodland. Mountain hemlock and Alaska cedar are the dominant tree species, but Sitka spruce, western hemlock, and lodgepole pine also can be found on this site. Crowberry is the dominant shrub species and ground cover largely consists of feather moss and sphagnum.

Associated sites

F220XY441AK	**Maritime Forest Gravelly Slopes** Maritime Forest Gravelly Slopes
F220XY442AK	**Maritime Forest Loamy Steep Slopes** Maritime Forest Loamy Slopes Steep

Similar sites

R220XY434AK	**Maritime Scrubland Peat Plain Depression** Ecological site F220XY434AK is characterized as a dwarf tree scrub woodland found on muskegs with a shallow water table. However, soils are poorly- to very poorly-drained and the site occurs on gently sloping mountain slopes and glacial outwash plains.

Table 1. Dominant plant species

Tree	(1) *Tsuga mertensiana* (2) *Callitropsis nootkatensis*
Shrub	(1) *Empetrum nigrum*
Herbaceous	(1) *Hylocomium splendens* (2) *Sphagnum*

Physiographic features

This site occurs on muskegs on mountain slopes. Flooding and ponding does not occur, but a shallow water table persists through much of the growing season and influences plant community dynamics. Soils are shallow, with bedrock occurring within 20 inches of the surface. Slopes range from 25 to 50% and soils are well-drained. The elevation of this site ranges from 70 to 660 feet above sea level and soil moisture regime is udic.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Muskeg (2) Mountains > Mountain slope
Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	70–660 ft
Slope	25–50%
Water table depth	10–14 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	70–660 ft
Slope	25–75%
Water table depth	10–14 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

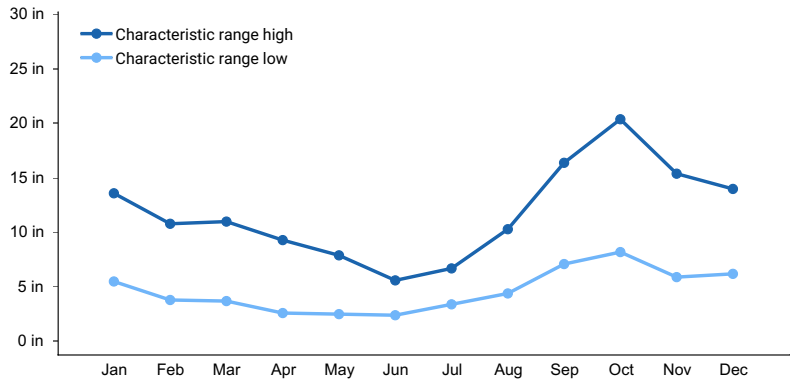


Figure 1. Monthly precipitation range

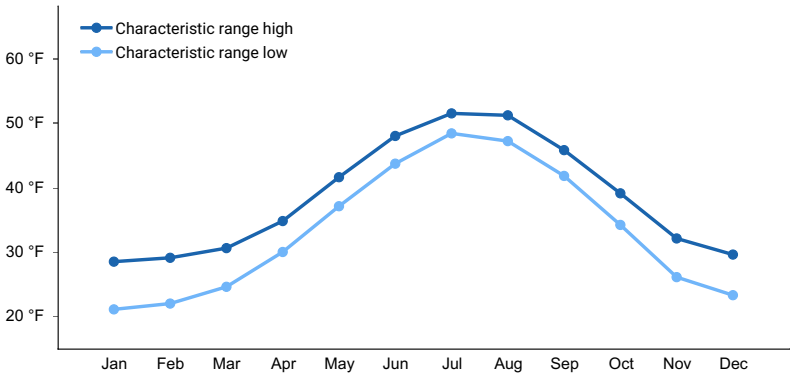


Figure 2. Monthly minimum temperature range

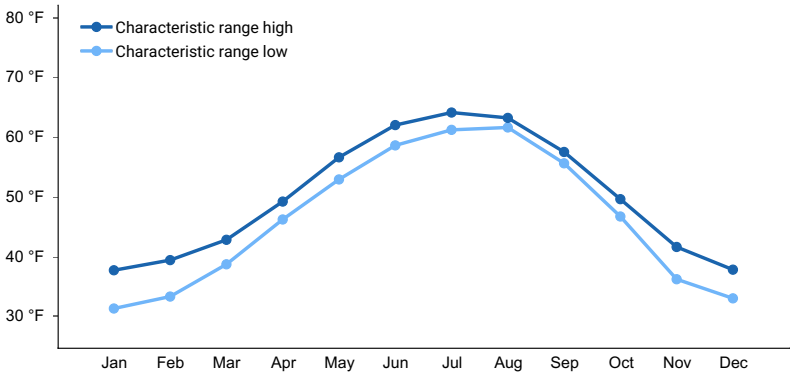


Figure 3. Monthly maximum temperature range

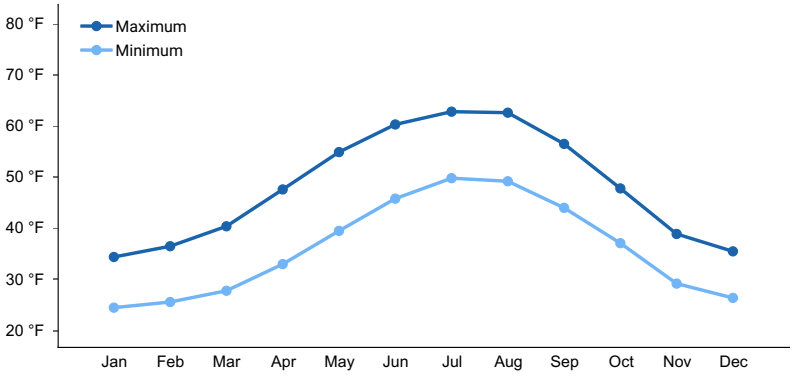


Figure 4. Monthly average minimum and maximum temperature

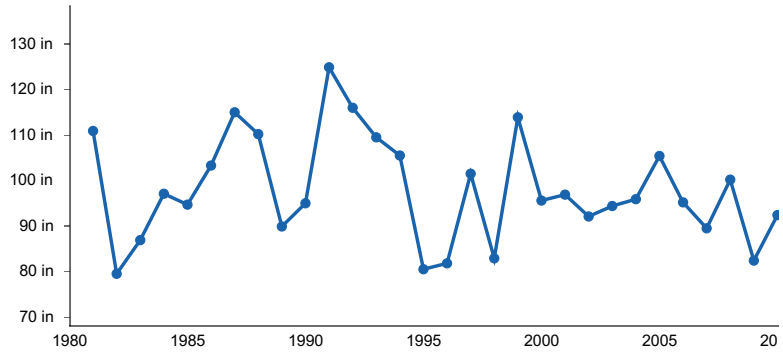


Figure 5. Annual precipitation pattern

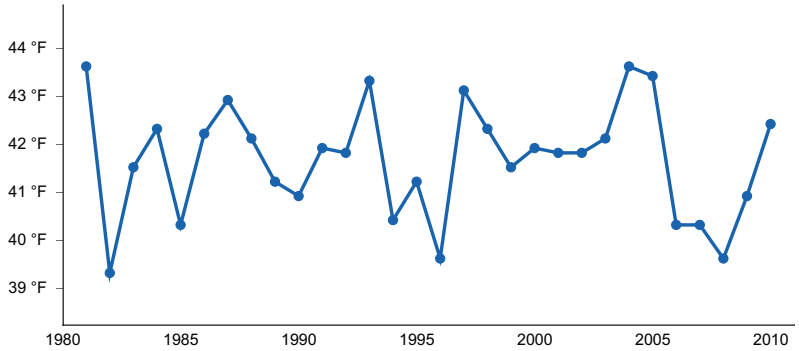


Figure 6. Annual average temperature pattern

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

Due to topographic position, flooding and ponding does not occur on this site. However, a shallow water table throughout the growing season influences plant community dynamics.

Soil features

The soils of this site formed in organic material over residuum and glacial till on muskegs and mountain slopes. Soils are generally well-drained on mountain slopes adjacent to muskegs, however, a shallow water table persists in the soils that comprise the muskegs themselves, stunting tree growth. Soils are generally shallow, with bedrock underlying within the first 20 inches.

Figure 7. This image is an example of the Toyatte soil series in Glacier Bay National Park.

Table 5. Representative soil features

Parent material	(1) Organic material (2) Till (3) Residuum
Surface texture	(1) Silt loam (2) Peat (3) Mucky peat
Family particle size	(1) Not used
Drainage class	Somewhat poorly drained to well drained
Permeability class	Moderate
Depth to restrictive layer	10–20 in
Soil depth	10–20 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	0.6–0.8 in
Calcium carbonate equivalent (0-40in)	0%
Clay content (0-20in)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	4.6–5.3
Subsurface fragment volume <=3" (0-60in)	0–4%
Subsurface fragment volume >3" (0-60in)	0%

Table 6. Representative soil features (actual values)

Drainage class	Somewhat poorly drained to well drained
Permeability class	Moderate

Depth to restrictive layer	0–20 in
Soil depth	0–20 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-10in)	0.2–4.9 in
Calcium carbonate equivalent (0-40in)	0%
Clay content (0-20in)	0–7%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	2–6
Subsurface fragment volume <=3" (0-60in)	0–60%
Subsurface fragment volume >3" (0-60in)	0–76%

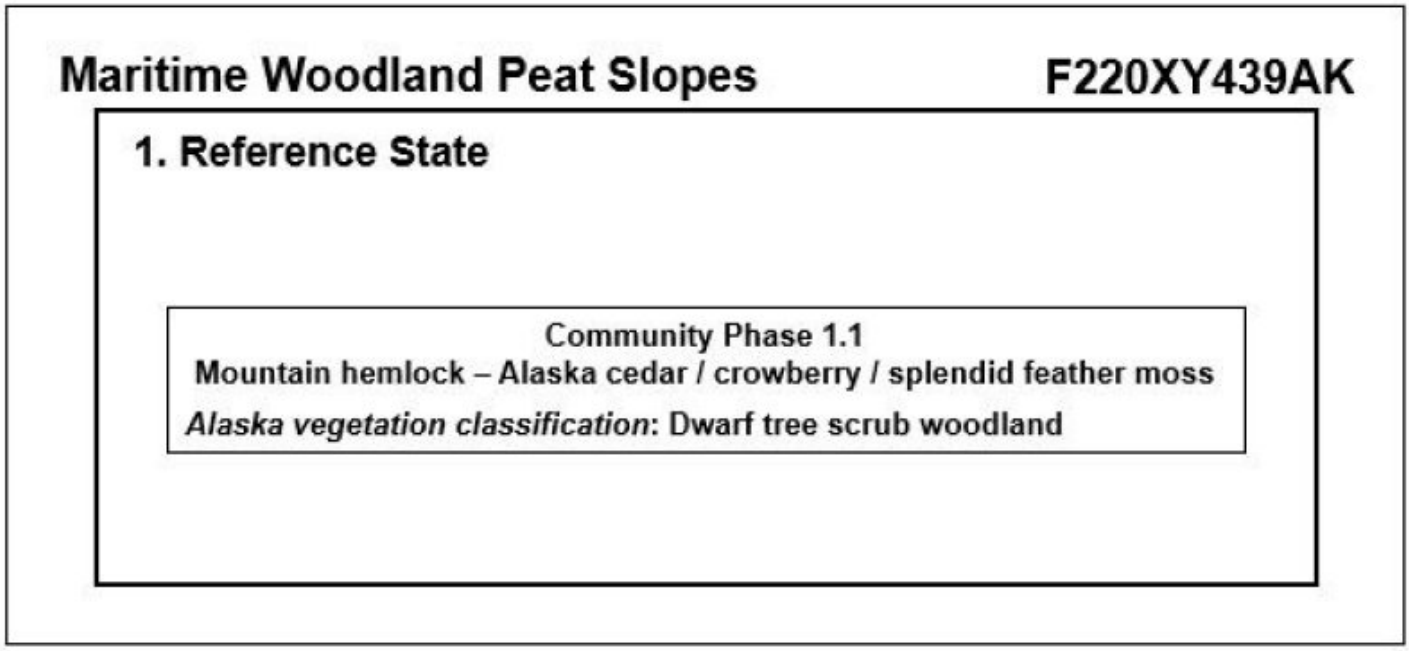
Ecological dynamics

This site is associated with muskegs on mountain slopes in the coastal mountains 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).

This ecological site occurs on the Outer Coast area of Glacier Bay National Park and Preserve. Although most of Glacier Bay has historically been glaciated during the Little Ice Age, the Outer Coast area was not glaciated during this period. As a result, the Outer Coast area is an older landscape and the associated soils are more developed than Glacier Bay Inlet. Moisture accumulates in the depressions of the Outer Coast area and results in a mosaic of muskegs throughout the mountains slopes of these coastal uplands. Ecological site F220XY439AK occurs on the upland muskegs.

This site supports a reference state comprised of one community phase characterized as a dwarf tree scrub woodland community. It consists of patches of stunted trees where a seasonal water table persists, surrounded by areas of higher productivity where growing conditions are more favorable to overstory species. Common overstory species include mountain hemlock, Alaska cedar, Sitka spruce, lodgepole pine, and western hemlock. Understory species are commonly made up of crowberry, feather mosses, sphagnum, and rusty menziesia.

State and transition model



State 1
Reference State

The reference state in comprised of a single community phase which is characterized as a dwarf tree scrub woodland. Common overstory species include mountain hemlock, Alaska cedar, Sitka spruce, lodgepole pine, and western hemlock.

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
- Sitka spruce (*Picea sitchensis*), tree
- lodgepole pine (*Pinus contorta*), tree
- western hemlock (*Tsuga heterophylla*), tree
- black crowberry (*Empetrum nigrum*), shrub
- rusty menziesia (*Menziesia ferruginea*), shrub
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Community 1.1
Mountain hemlock - Alaska cedar / crowberry/ splendid feather moss

The reference community phase is characterized as a dwarf tree scrub woodland community. It consists of patches of stunted trees where a seasonal water table persists, surrounded by areas of higher productivity where growing conditions are more favorable to overstory species. Common overstory species include mountain hemlock, Alaska cedar, Sitka spruce, lodgepole pine, and western hemlock. Common understory species are crowberry, feather mosses, sphagnum, and rusty menziesia.

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- rusty menziesia (*Menziesia ferruginea*), shrub
- splendid feather moss (*Hylocomium splendens*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Table 7. Soil surface cover

Tree basal cover	0-75%
Shrub/vine/liana basal cover	0-100%
Grass/grasslike basal cover	0-25%
Forb basal cover	0-25%
Non-vascular plants	0-85%
Biological crusts	0%
Litter	15-65%
Surface fragments >0.25" and <=3"	0%
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
13TD00103 Community 1.1
13TD03701 Community 1.1
14NP01301 Community 1.1
14JP01202 Community 1.1
14JP01205 Community 1.1
13TD00902 Community 1.1
13NP00503 Community 1.1
13NP01004 Community 1.1
14JP01103 Community 1.1
14JP01204 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:**