USDA Natural Resources
Conservation Service

Ecological site R220XY434AK
Maritime Scrubland Peat Plain Depression

Last updated: 3/10/2025
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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 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 in organic soils on muskegs of glaciated plains and mountain slopes. A shallow water table persists throughout much of the growing season and influences plant community dynamics. Soils are very poorly drained, and textures are generally peat overlaying residuum.

The site supports a reference state comprised of a single plant community phase that is characterized as a dwarf tree scrubland (Viereck et al., 1992). Lodgepole pine commonly occurs but is stunted and has limited cover. Other common species include crowberry, bog laurel, various sedges, and sphagnum.

Associated sites

F220XY440AK	**Maritime Forest Loamy Plains** Ecological site F220XY440AK is characterized as an open needleleaf forest occurring on shallow soils and abuts R220XY434AK on glaciated till plains.
F220XY441AK	**Maritime Forest Gravelly Slopes** Ecological site F220XY441AK occurs on well-drained soils and supports a closed needleleaf forest community. R220XY434AK occurs proximal to F220XY441AK on low-elevation mountain slopes.

Similar sites

F220XY439AK	**Maritime Stunted Woodland Shallow Organic Slopes** Ecological site F220XY439AK is similar to ecological site R220XY434AK with potential for both sites to occur in close proximity. F220XY439AK (Maritime Forest Shallow Organic Slopes) is characterized by well-drained soils with bedrock occurring within the first 20 inches and a shallow, seasonal water table. F220XY439AK occurs on topographic, micro-high positions while R220XY434AK occurs on micro-low depressions, where soils are poorly to very-poorly drained with a persistent shallow water table.

Table 1. Dominant plant species

Tree	(1) *Pinus contorta*
Shrub	(1) *Empetrum nigrum* (2) *Kalmia polifolia*
Herbaceous	(1) *Carex* (2) *Sphagnum*

Physiographic features

This site occurs on muskegs on glaciated coastal plains and mountain slopes. Flooding does not occur and a water table persists near the soil surface for much of the growing

season. This site commonly occurs between 50 and 100 feet above sea level on slopes ranging from 0 to 15%. Aquic soil moisture conditions associated with a shallow water table are a driving force of plant community dynamics on this site.

Table 2. Representative physiographic features

Landforms	(1) Outwash plain > Muskeg (2) Mountains > Muskeg
Runoff class	Low
Flooding frequency	None
Ponding frequency	None
Elevation	15–30 m
Slope	0–15%
Water table depth	10–23 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Low
Flooding frequency	None
Ponding frequency	None
Elevation	12–250 m
Slope	0–15%
Water table depth	0–23 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)	89-139 days
Freeze-free period (characteristic range)	126-181 days

Precipitation total (characteristic range)	1,118-2,388 mm
Frost-free period (actual range)	77-147 days
Freeze-free period (actual range)	116-184 days
Precipitation total (actual range)	787-3,556 mm
Frost-free period (average)	110 days
Freeze-free period (average)	153 days
Precipitation total (average)	1,880 mm

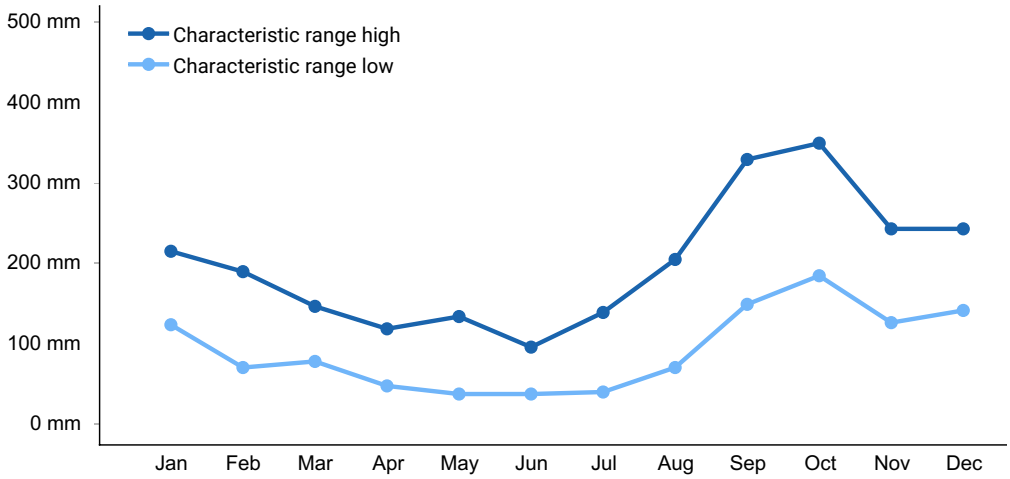

Figure 1. Monthly precipitation range

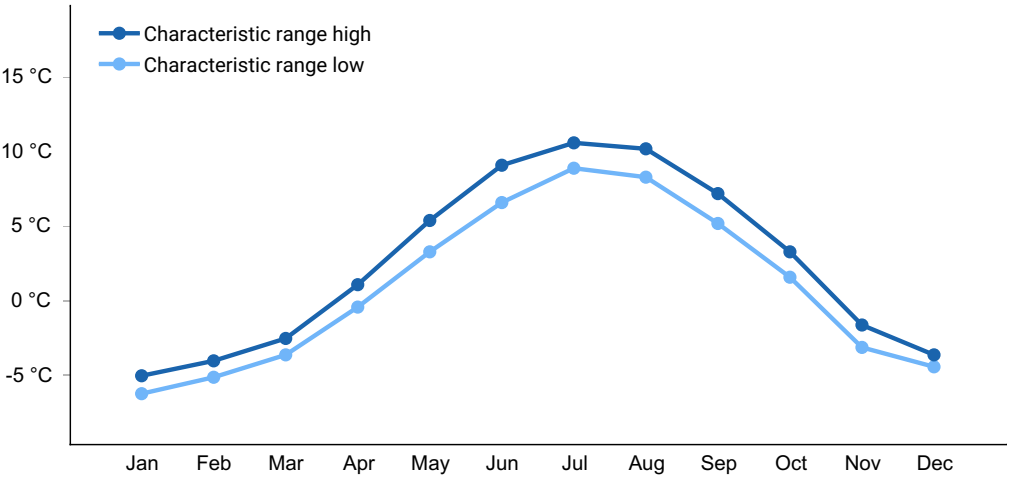

Figure 2. Monthly minimum temperature range

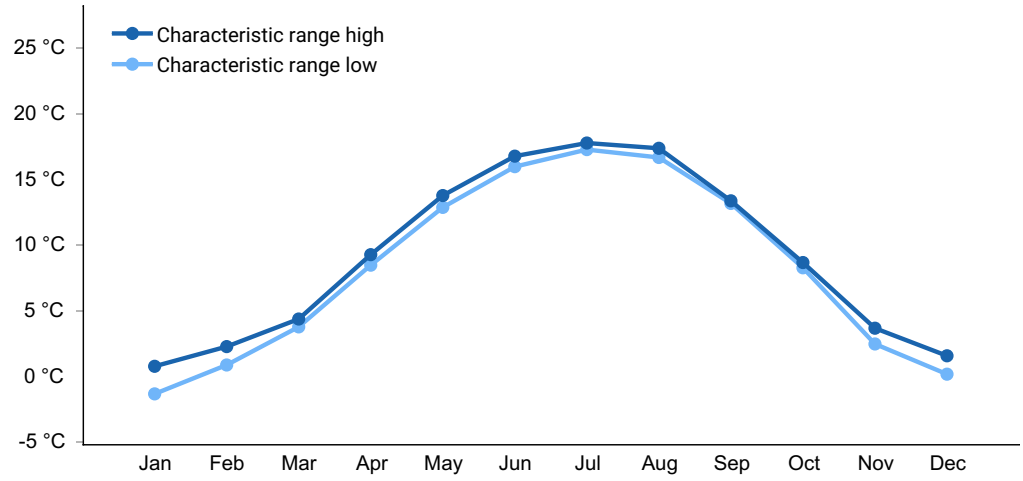

Figure 3. Monthly maximum temperature range

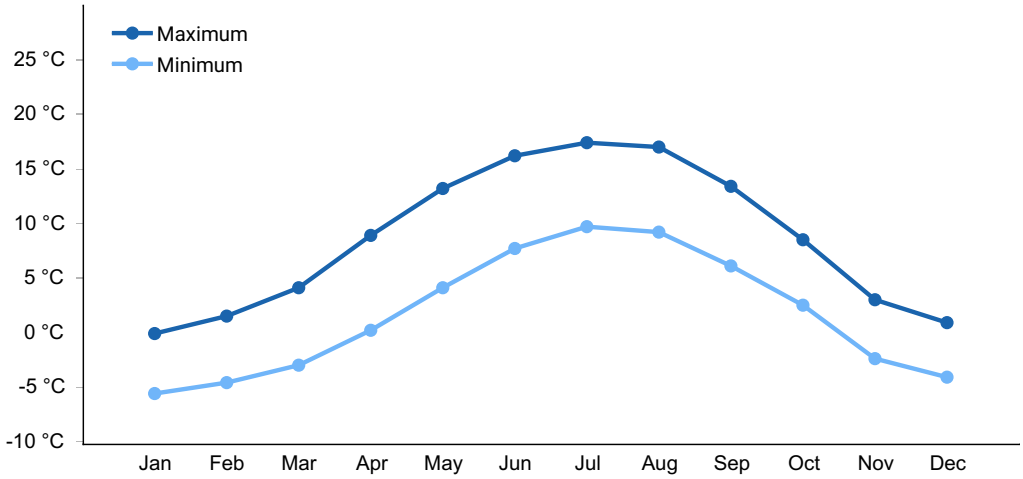

Figure 4. Monthly average minimum and maximum temperature

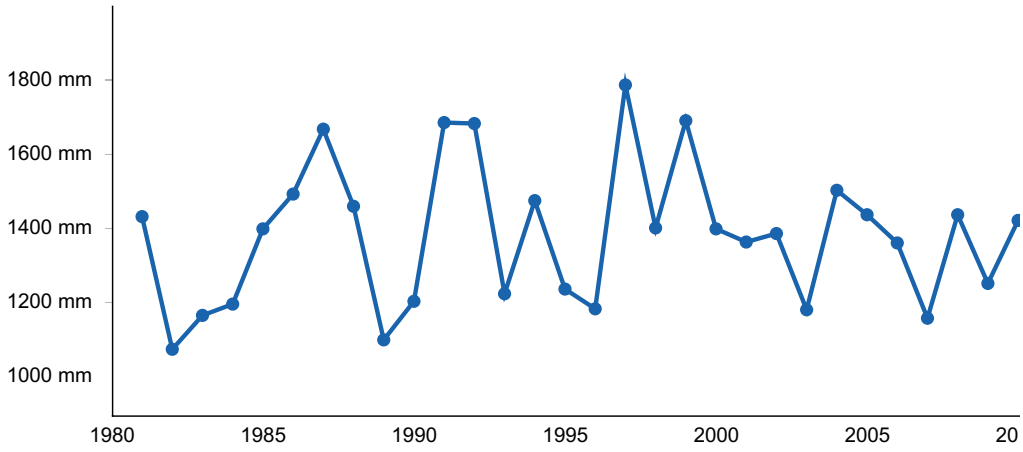

Figure 5. Annual precipitation pattern

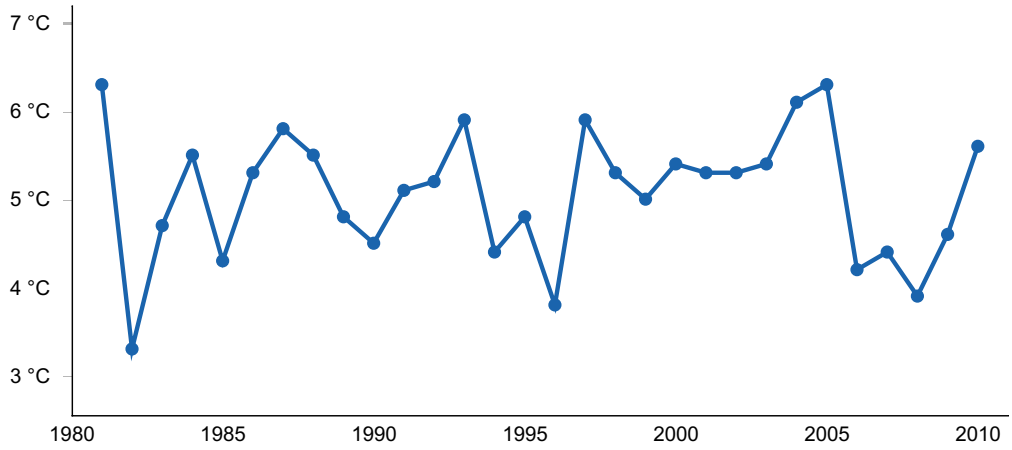

Figure 6. Annual average temperature pattern

Climate stations used

- (1) 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

Influencing water features

This site is associated very poorly drained soils and a water table that occurs near the surface during much of the growing season. This high water table is thought to influence plant community dynamics in the reference state.

Soil features

The soils of this site are formed in organic material over residuum. Soil textures are peaty and soils are very poorly drained. A shallow water table persists for long periods of time during the growing season. The soil moisture regime is aquic.

Figure 7. This image is an example of the Charpentier soil series.

Figure 8. This image is an example of the Kashoto soil series.

Table 5. Representative soil features

Parent material	(1) Mossy organic material (2) Residuum
Surface texture	(1) Peat
Family particle size	(1) Not used
Drainage class	Very poorly drained
Soil depth	0 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%

Available water capacity (0-25.4cm)	7.62–14.48 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Clay content (0-50.8cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	3.4–4.7
Subsurface fragment volume <=3" (0-152.4cm)	0%
Subsurface fragment volume >3" (0-152.4cm)	0%

Table 6. Representative soil features (actual values)

Drainage class	Very poorly drained to poorly drained
Soil depth	0 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-25.4cm)	7.62–14.48 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Clay content (0-50.8cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	3.2–4.7
Subsurface fragment volume <=3" (0-152.4cm)	0%
Subsurface fragment volume >3" (0-152.4cm)	0%

Ecological dynamics

This site is associated with muskegs on glaciated coastal plains and mountain slopes 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 across the upland plains. Ecological site R220XY434AK is in these muskegs.

The site supports a reference state that is comprised of one community phase characterized as a dwarf tree scrubland community (Viereck et al, 1992). It consists of patchy, dense, low productivity trees within a mosaic of hydrophilic graminoids and forbs. Common species include lodgepole pine, Alaska cedar, crowberry, alpine laurel, longawn sedge, tufted bulrush, and Sphagnum. The ground cover is dominantly herbaceous litter and moss. Some areas are covered with standing water. No other community phases or alternative states have been observed on this site.

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities

1.1. Lodgepole pine / sedge - bulrush / Sphagnum

State 1
Reference State

The reference state supports one community phase characterized as a dwarf tree scrub woodland. Plant community dynamics in the reference state appear to be largely controlled by the influences of a shallow water table.

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

- lodgepole pine (*Pinus contorta*), tree
- Alaska cedar (*Callitropsis nootkatensis*), tree
- black crowberry (*Empetrum nigrum*), shrub
- sedge (*Carex*), grass
- sphagnum (*Sphagnum*), other herbaceous

Community 1.1
Lodgepole pine / sedge - bulrush / Sphagnum

Figure 9. Typical plant community associated with community 1.1.

The reference community phase is characterized as a dwarf tree scrubland community. It consists of patchy, dense, low productivity trees within a mosaic of hydrophilic graminoids and forbs. Common species include lodgepole pine, Alaska cedar, crowberry, alpine laurel, longawn sedge, tufted bulrush, and Sphagnum. The ground cover is dominantly herbaceous litter and moss. Some areas are covered with standing water.

Dominant plant species

- lodgepole pine (*Pinus contorta*), tree
- black crowberry (*Empetrum nigrum*), shrub
- bog laurel (*Kalmia polifolia*), shrub
- sedge (*Carex*), grass
- bulrush (*Trichophorum*), grass
- sphagnum (*Sphagnum*), other herbaceous

Table 7. Soil surface cover

Tree basal cover	0-15%
Shrub/vine/liana basal cover	0-40%
Grass/grasslike basal cover	5-45%
Forb basal cover	0-25%
Non-vascular plants	5-95%
Biological crusts	0%
Litter	0-75%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%

Water	0-100%
Bare ground	0%

Additional community tables

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)

Table 9. Community 1.1 forest understory composition

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

Inventory data references

NASIS ID Plant Community
13NP00502 Community 1.1
14NP01101 Community 1.1
14NP01103 Community 1.1
14NP01203 Community 1.1
13TD00601 Community 1.1
13NP01002 Community 1.1
13NP01003 Community 1.1
14NP01503 Community 1.1
14NP02002 Community 1.1
14NP02102 Community 1.1
14DM00801 Community 1.1
14DM00803 Community 1.1
14JP01905 Community 1.1

Other references

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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	05/21/2025
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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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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:**