USDA Natural Resources
Conservation Service

Ecological site R245XY405AK
Arctic scrub loamy frozen floodplain wet

Last updated: 5/28/2025
Accessed: 02/01/2026

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): 245X–Arctic Foothills

The Arctic Foothills MLRA (MLRA 245X) includes the broad, rounded hills and nearly level uplands at the northern base of the Brooks Range from Point Hope, in the west, to Demarcation Point, in the east. It makes up about 45,565 square miles. Periglacial features occur throughout the area. The area is entirely undeveloped wildland and is sparsely populated. It is in the zone of continuous permafrost. MLRA 245X has boundaries based on physiography with MLRAs 242X, 243X, 244X, and 246X. MLRA 242X (Northern Seward Peninsula-Selawik Lowlands), near Kivalina Lagoon, is distinguishable by nearly level to rolling plains, river deltas, and extended mountain footslopes. MLRA 243X (Western Brooks Range Mountains), encompasses the southern slopes of the De Long Mountains, the Baird Mountains, the Noatak River drainage, and the lower Kobuk River drainage. MLRA 244X (Northern Brooks Range Mountains) has steep, rugged, high mountains and narrow valleys. MLRA 246X (Arctic Coastal Plain) has a level to gently rolling plain along the coast of the Arctic Ocean. MLRA 245 also is bordered by the Chukchi Sea.

Land ownership:
MLRA 245X encompasses the northernmost portions of the Noatak National Preserve, Gates of the Arctic National Park, and the Arctic National Wildlife Refuge (ANWR).
The Noatak National Preserve is located along the Noatak River Corridor. The Noatak River is the nation’s largest unaltered river basin, and the preserve is around 6.5 million acres. 5.7 million acres of the preserve is designated as wilderness. The Noatak River is also a designated National Wild and Scenic River.
Gates of the Arctic National Park is the northernmost national park in the United States, situated entirely north of the Arctic Circle. The area of the park and preserve is the second

largest in the US at 8,472,506 acres, second only to Wrangell-St. Elias National Park and Preserve. The park features six Wild and Scenic Rivers.
The Arctic National Wildlife Refuge (ANWR) is a 19,286,772-acre wildlife refuge located in northeastern Alaska. It is the largest wildlife refuge in the country. The ANWR is home to a diverse range of endemic mammal species and hundreds of species of migratory birds.
The majority of MLRA 245 is managed by the BLM, USFWS, and the State of Alaska. The BLM manages 17,027,543 acres, around 58 percent of the MLRA. The USFWS manages 4,650,388 acres, around 16 percent of the MLRA, and the State of Alaska has a patent on 10,375,908 acres of the MLRA, around 36 percent of the MLRA.

Climate:
Brief, cool summers and long, very cold winters characterize the arctic climate of the Arctic Foothills MLRA. The average annual precipitation ranges 11.9 and 12.8 inches. Average annual snowfall ranges from about 40 to 60 inches. The average annual temperature ranges from 12 to 29 degrees Fahrenheit. The average freeze-free period is between 10 and 55 days.

Geology:
This MLRA remained unglaciated during the Pleistocene Epoch, except possibly for the upper areas along the edge of the Northern Brooks Range Mountains MLRA. Bedrock and coarse to fine rubble cover the surface of convex uplands. Elsewhere, Quaternary surface deposits include various alluvial, eolian, or glaciofluvial materials. Slightly modified to highly modified moraines and drift occur in areas adjacent to the Brooks Range. The bedrock geology consists primarily of Cretaceous and Late Paleozoic to Lower Mesozoic stratified sedimentary rocks or uplifted Cretaceous and Tertiary continental deposits.

Soils:
The dominant soil order within this MLRA is Gelisols with Inceptisols covering a comparatively minor extent. These Gelisols are shallow or moderately deep to permafrost and are typically poorly to very poorly drained. Miscellaneous (nonsoil) areas make up about 6 percent of this area and are primarily rock outcrop, talus, and ice.
Gelisols are soils that have permafrost within 100 cm of the soil surface and/or have gelic materials within 100 cm of the soil surface and have permafrost within 200 cm. Gelic materials are mineral or organic soil materials that have evidence of cryoturbation (frost churning) and/or ice segregation in the active layer (seasonal thaw layer) and/or the upper part of the permafrost (NRCS 2024). The common suborders of Gelisols within this MLRA are Turbels, Histels, and Orthels.
The Histels have thick accumulations of surface organic material and are associated with high-center polygons. The Orthels and Turbels have comparably thinner surface organic material and occur on high floodplains, stream terraces, low-center polygons, and the slopes of hills and plains. Turbels show signs of cryoturbation while Orthels do not.
Inceptisols lack permafrost and are soils that have altered horizons that have lost bases or iron and aluminum but retain some weatherable minerals. They do not have an illuvial horizon enriched with either silicate clay or with an amorphous mixture of aluminum and organic carbon (NRCS 2024). The common suborder of Inceptisols in this MLRA are

Gelepts, which are associated with dry and gravelly soils on the slopes of hills and plains.

Vegetation dynamics:
The hills and plains in this MLRA support dwarf scrub vegetation dominated by Dryas, black crowberry, and dwarf willow communities. On shallow, rocky soils and exposed landforms, lichens and scattered herbs dominate the ground layer. On more mesic soils, sedges, forbs, and mosses cover most of the surface. The mesic and deeper soils in valleys and basins and on terraces generally support low and dwarf willow and ericaceous shrub scrub and mesic graminoid herbaceous communities, commonly with extensive areas of tussock-forming sedges. Depressions, drainageways, and other saturated sites support wet sedge meadows and wet sedge-moss meadows. Flood plains support a mixture of tall and low scrub dominated by various willows, shrub birch, and some alder.

Classification relationships

Landfire Biophysical Settings – 6816980 – Alaska Arctic Wet Sedge Meadow (Landfire 2009)

Viereck Communities:

Wet sedge meadow tundra – III.A.3.a (Viereck et al. 1994)

Ecological site concept

• Arctic climate
• Associated landforms are flood plains on foothills.
• Soils are underlain by permafrost at 31 inches
• Soils are derived from organic material and silty alluvium.
• Soils are considered well drained and occasionally flood for brief periods of time
• The reference plant community is characterized as a wet sedge meadow tundra (Viereck et al 1994) with the dominant plants being willows, sedges, and tussock cottongrass.

Associated sites

R245XY406AK	**Arctic scrub loamy frozen floodplain** Ecological sites 405 and 406 are both found on floodplains. Ecological site 406 is found in troughs, while site 405 is found on terraces. This leads to differences in soil moisture content, water table depth, and permafrost presence which all impact the type and distribution of vegetation found at the two sites.

Similar sites

R245XY406AK	**Arctic scrub loamy frozen floodplain** Ecological sites 405 and 406 are both found on floodplains. Ecological site 406 is found in troughs, while site 405 is found on terraces.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix fuscescens* (2) *Salix pulchra*
Herbaceous	(1) *Carex aquatilis* (2) *Eriophorum angustifolium*

Physiographic features

The Arctic scrub loamy floodplain ecological site occurs on flood plains and high flood plains on foothills. Elevation ranges between 20 and 4220 feet. Associated foothills are very gently sloping, if at all. This site occurs on all aspects and shows no preference for north-facing or south-facing slopes. Flooding occurs occasionally for brief durations. Soils are considered well drained. The flooding duration is brief, and there is no ponding at this site. A water table occurs at very shallow depths for portions of the growing season.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Flood plain
Runoff class	Medium
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Rare to occasional
Ponding frequency	None
Elevation	79–268 m
Slope	0–2%
Water table depth	0–25 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding duration	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified

Elevation	6–1,286 m
Slope	Not specified
Water table depth	Not specified

Climatic features

The arctic climate of MLRA 245X is characterized by brief, cool summers and long, very cold winters. The average annual precipitation ranges between 7 and 19 inches. The average annual snowfall ranges from about 40 to 60 inches. The average annual temperature ranges from 10 to 20 degrees Fahrenheit. The average freeze-free period is fewer than 10 days to 55 days.

Table 4. Representative climatic features

Frost-free period (characteristic range)	19-44 days
Freeze-free period (characteristic range)	39-55 days
Precipitation total (characteristic range)	305-330 mm
Frost-free period (actual range)	3-65 days
Freeze-free period (actual range)	10-98 days
Precipitation total (actual range)	178-483 mm
Frost-free period (average)	33 days
Freeze-free period (average)	59 days
Precipitation total (average)	305 mm

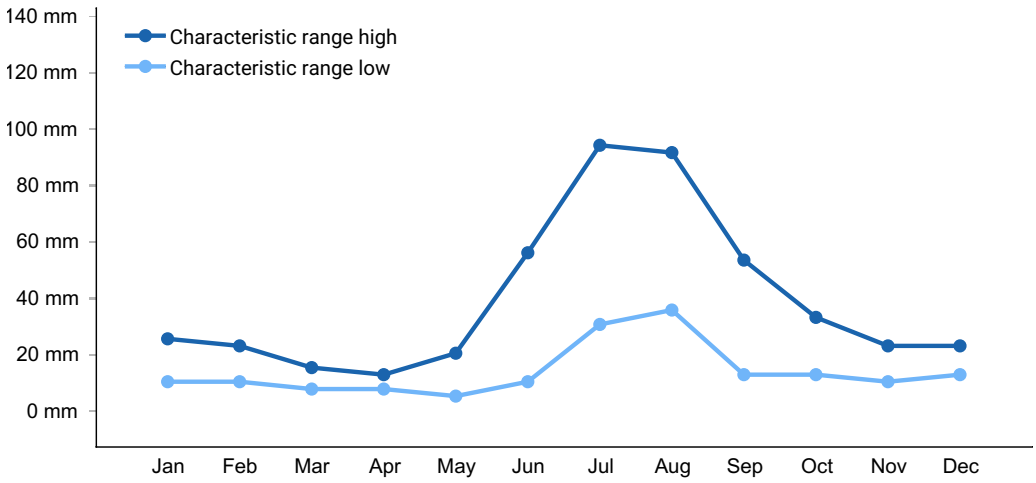

Figure 1. Monthly precipitation range

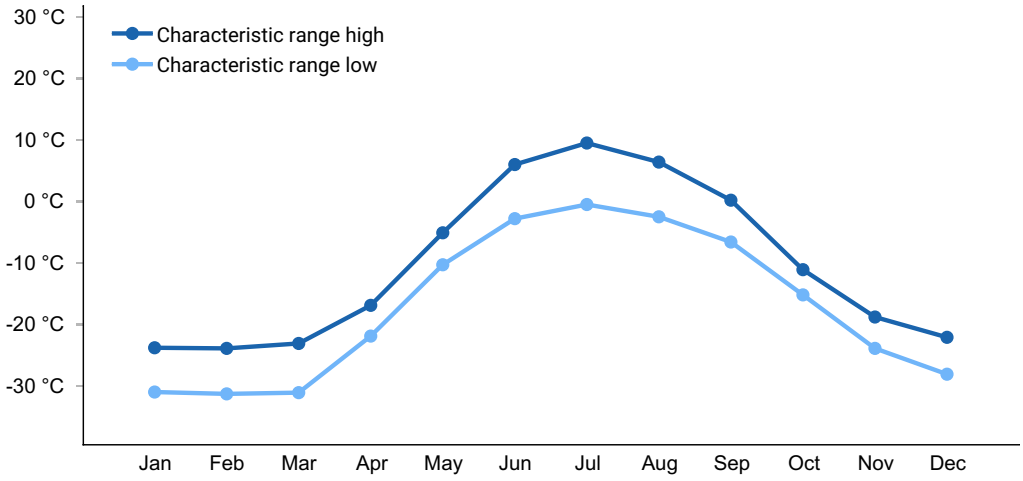

Figure 2. Monthly minimum temperature range

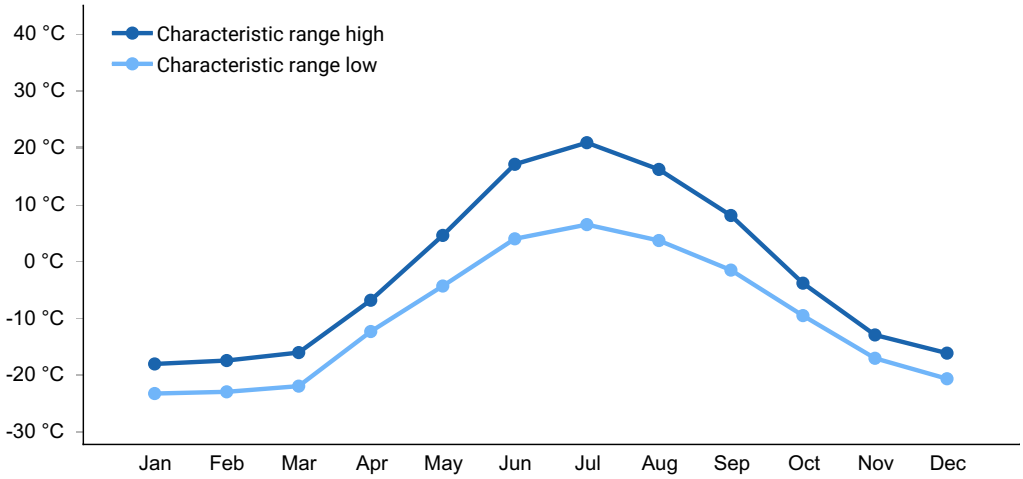

Figure 3. Monthly maximum temperature range

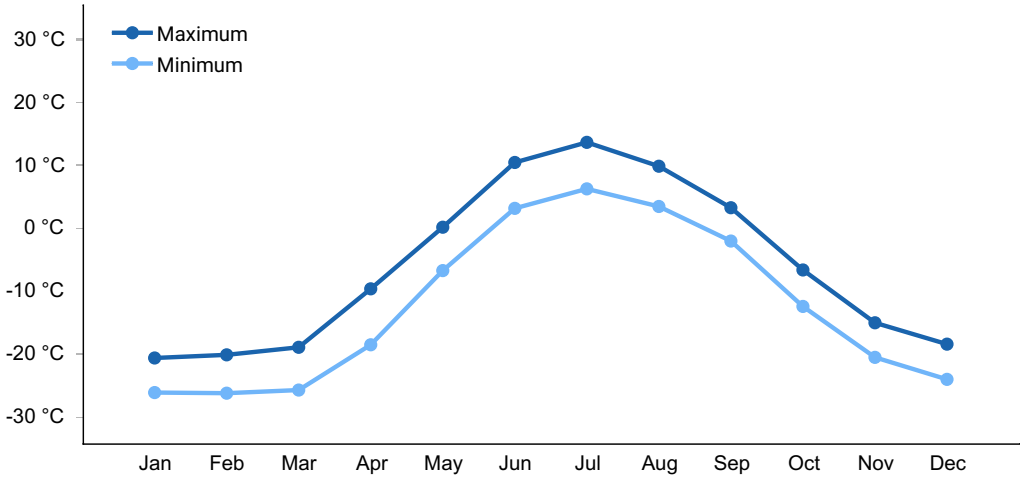

Figure 4. Monthly average minimum and maximum temperature

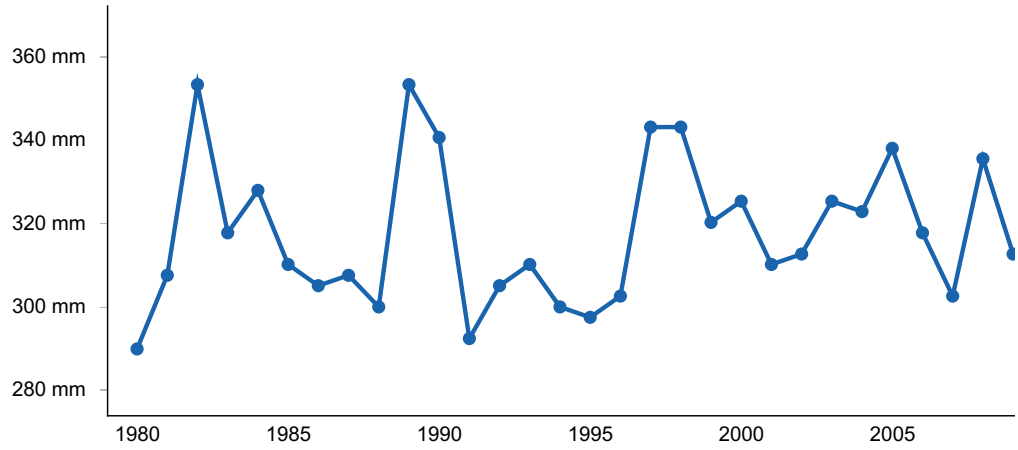

Figure 5. Annual precipitation pattern

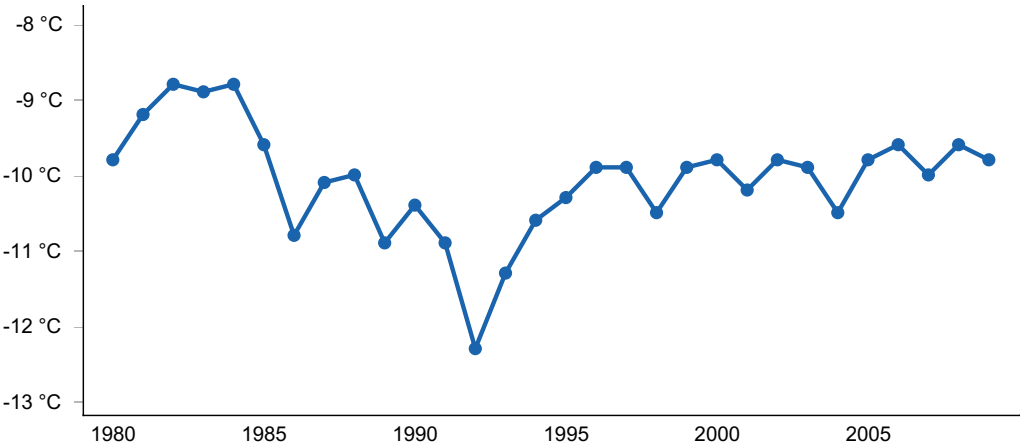

Figure 6. Annual average temperature pattern

Influencing water features

This ecological site occurs in flood plains and riparian corridors in association with stream channels. Dominant water sources are often over bank flow from the channel or subsurface hydraulic connections between the stream channel and wetlands. However, sources may be interflow and return flow from adjacent uplands, occasional overland flow from adjacent uplands, tributary inflow, and precipitation. Perennial flow in the channel is not a requirement.

Wetland description

This ecological site is classified as a riverine wetland under the Hydrogeomorphic (HGM) classification system (Smith et al. 1995; USDA-NRCS 2008). At their headwater, riverine wetlands often are replaced by slope or depressional wetlands where the channel morphology may disappear. They may intergrade with poorly drained flats or uplands.

Soil features

• Soils formed in alluvium
• Rock fragments of any size are not common on this site
• The surface mineral horizon is a mucky silt formed from sand and alluvium
• Soils are very deep
• Permafrost is a restriction that occurs at very shallow to moderate depths (9 to 35 inches)
• These are considered poorly drained soils
• Soils range from very strongly acidic to moderately alkaline

Table 5. Representative soil features

Parent material	(1) Organic material (2) Alluvium
Surface texture	(1) Silt
Family particle size	(1) Coarse-loamy
Drainage class	Poorly drained
Permeability class	Moderately rapid
Depth to restrictive layer	23–89 cm
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	6.1–11.94 cm
Clay content (0-50.8cm)	Not specified
Electrical conductivity (25.4-101.6cm)	Not specified
Sodium adsorption ratio (0-25.4cm)	3–7
Subsurface fragment volume <=3" (0-152.4cm)	0–5%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Depth to restrictive layer	Not specified
Soil depth	Not specified
Surface fragment cover <=3"	Not specified

Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	Not specified
Clay content (0-50.8cm)	0–2%
Electrical conductivity (25.4-101.6cm)	0–3 mmhos/cm
Sodium adsorption ratio (0-25.4cm)	Not specified
Subsurface fragment volume <=3" (0-152.4cm)	Not specified

Ecological dynamics

The Arctic Foothills MLRA has a harsh climate, cold soils and occurs in the zone of continuous permafrost. This MLRA occurs in the arctic biome and has a growing season that is both short and cold. As a result, the vertical and horizontal structure of vegetation is severely limited. Vegetation within the arctic biome is typically restricted to dwarf shrubs, mosses, and lichens.

Vegetation over most of this MLRA consists of mesic graminoid herbaceous and dwarf scrub communities. Open low scrub occurs along drainages. Mesic graminoid herbaceous communities dominated by tussock-forming sedges are widespread. Typical species are tussock cottongrass and Bigelow's sedge. Low shrubs, such as dwarf arctic birch, crowberry, Labrador-tea, and mountain-cranberry often occur and may co-dominate with sedges. Mosses and lichens are commons between tussocks. Dwarf scrub communities are dominated by mat forming Dryas species accompanied by ericaceous species (Gallant et al 1995).

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities

1.1. bog willow - tealeaf willow / water sedge - tall cottongrass / sphagnum

State 1
Reference State

The reference plant community is characterized as wet sedge meadow tundra (Viereck et al. 1992). This ecological site has no known associated disturbance regimes and has one plant community within the reference state. All plant communities associated with this ecological site have limited data, so the state-and-transition model is provisional.

Dominant plant species

- Alaska bog willow (*Salix fuscescens*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- water sedge (*Carex aquatilis*), other herbaceous
- tall cottongrass (*Eriophorum angustifolium*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous

Community 1.1
bog willow - tealeaf willow / water sedge - tall cottongrass / sphagnum

This plant community is characterized as a wet sedge meadow (Viereck et al. 1992) with the dominant plants being bog willow, tealeaf willow, bog rosemary, water sedge, tall cottongrass, saltmarsh sedge, and Sphagnum. The vegetative strata with the highest cover are low shrubs, sedges, and moss (Landfire 2009).

Dominant plant species

- Alaska bog willow (*Salix fuscescens*), shrub
- tealeaf willow (*Salix pulchra*), shrub
- bog rosemary (*Andromeda polifolia*), shrub
- water sedge (*Carex aquatilis*), other herbaceous
- tall cottongrass (*Eriophorum angustifolium*), other herbaceous
- lesser saltmarsh sedge (*Carex glareosa*), other herbaceous
- round sedge (*Carex rotundata*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous
- drepanocladus moss (*Drepanocladus*), other herbaceous

Additional community tables

Animal community

Mammals common to the area include brown bear, wolf, wolverine, caribou, Arctic fox, snowshoe hare, tundra hare, hoary marmot, brown lemming, and northern bog lemming. Musk oxen, which were decimated by hunting in the late 1800s, are becoming more common in many places. Common birds include willow ptarmigan, rough-legged hawk, American golden plover, short-eared owl, and snowy owl. Arctic char and Arctic grayling are in most of the rivers.

Recreational uses

Local residents use this area primarily for subsistence hunting, fishing, and gathering. Sport hunting, fishing, and gathering. Sport hunting and other kinds of wildland recreation are becoming increasingly important. Most visitors are served by air taxi, guiding, and outfitting companies operating out of the major Alaska communities. Most of the communities in the area are along the major rivers at the lower elevations or are on the coast.

Gates of the Arctic National Park, the Arctic National Wildlife Refuge, and the Noatak National Preserve are all partially located in MLRA 245. Gates of the Arctic National Park is the least visited national park in the United States and has no formal infrastructure or trails.

Other products

Some limited extraction of minerals, including oil and gas, occurs only locally.

Inventory data references

The vegetation modeled for this site has limited data and is considered provisional. The associated model was largely developed from NRCS staff with working knowledge of the area and literature review.

Other references

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Contributors

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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	02/01/2026
Approved by	Blaine Spellman
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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

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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:**