USDA Natural Resources
Conservation Service

Ecological site R225XY330AK
Alpine Dwarf Scrub Slopes

Last updated: 6/14/2025
Accessed: 03/10/2026

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): 225X–Southern Alaska Peninsula Mountains

Major Land Resource Area 225X (Southern Alaska Peninsula Mountains), herein called area, is in the Southern Alaska Land Resource Region (LRR). MLRA 225X covers approximately 23,935 square miles of the southern parts of the Kodiak Archipelago and the slopes of the southern Aleutian Mountains on the Alaska Peninsula. The landscape is comprised of rugged mountains separated by narrow valleys, with outwash plains and low hills towards the coast. Glaciers and ice fields cover the highest mountains. Flood plains are predominantly restricted to broad river valleys. Elevations range from sea level to 9,372 feet at the summit of Shishaldin Volcano. The soils and vegetation in this MLRA have been influenced by ash deposits from nearby Mount Katmai and surrounding volcanoes. This MLRA is primarily comprised of wilderness, with towns and villages primarily located along rivers, lakes, and the coast. Small villages are scattered along the coastline and include King Cove, Old Harbor, Karluk, and Larsen Bay among others. There is no road access to MLRA 225X from Anchorage, AK, and access is primarily via plane or boat.

MLRA 225X, excluding high peaks and steep upper backslopes, was glaciated during the Late Pleistocene. Glacial deposits were eroded or covered by colluvium or alluvium during the Holocene, which comprises 60 percent of the current landscape. Modified glacial moraines and outwash landforms are prevalent. Volcanic activity continues through the present day, and ash deposits are represented in many of the soils of this MLRA.

The dominant soil orders are Andisols, Histosols, and Inceptisols. Soils have a cryic temperature regime or subgelic soil temperature class, an aquic or udic soil moisture regime, and primarily amorphic mineralogy. Permafrost is sporadic in the Southern Alaska

LRR. The primary soils in this MLRA developed from volcanic ash over colluvium or from thick organic material. Miscellaneous (non-soil) areas comprise greater than 50 percent of all acreage in this MLRA and includes “rock outcrops, rubble land, glaciers, riverwash, and beaches” (USDA-NRCS, 2022).

The climate in this MLRA is shaped by maritime influences from Bristol Bay to the west and the Pacific Ocean to the south. Mountains effect local patterns in temperature and precipitation. Temperatures are typically cool throughout the year. The mean annual temperature at sea level is 37 to 43 degrees Fahrenheit. Precipitation ranges from 30 inches along the coast to over 100 inches at high elevations. Snowfall ranges from 50 to 200 inches and glaciers and icefields are present at higher elevations.

This MLRA is dominated by tall alder and willow shrubs at lower elevations. Vegetation shifts to low and then dwarf shrubs at increased elevations. Herbaceous communities are on exposed plains and hills, and sedges dominate wet depressions. Balsam poplar forests are restricted to flood plains and warm, low mountain slopes in the northern parts of the MLRA (USDA-NRCS, 2022).

LRU notes

MLRA 225X supports three life zones delineated by the physiological limits of plant communities along longitudinal and elevational gradients: Aleutian, South Alaska maritime, and South Alaska alpine. The Aleutian climate covers hills of the southern Kodiak archipelago and on the extended Alaska Peninsula. These regions are low-lying, exposed and are scoured by winter winds. Vegetation is primarily low shrublands, heathlands and often diverse herbaceous meadows. The South Alaska maritime climate is common in mountainous areas where local site conditions delineate alpine and lowland areas. Certain vascular plant species are common in the lowlands and much less common in the alpine (i.e. Populus balsamifera, Alnus spp., Salix pulchra, Betula nana, Ledum palustre ssp. decumbens, and Calamagrostis canadensis). The alpine generally occurs at elevations above 1,500 feet, though may extend higher on warm, north-facing slopes, and lower on cooler slopes. Vascular plants are restricted in height and often exclude common lowland species. The transition between South Alaska maritime and alpine vegetation can occur within a range of elevations, and is highly dependent on latitude, slope, aspect, and shading from adjacent mountains.

Classification relationships

Alaska Vegetation Classification:
Ericaceous dwarf scrub (II.D.2 – level III) / Crowberry tundra (II.D.2.c - level IV)
(Viereck et al., 1992)

Circumboreal Vegetation Map – Alaska-Yukon Region:
Southern Alaska- Yukon Alpine Dwarf Scrub and Meadows
Aleutian Alpine Dwarf Scrub and Meadows

(Jorgensen and Meidinger, 2015)

LANDFIRE BioPhysical Settings: 7617300 – Aleutian Sparse Heath and Fell-field
(Landfire, 2009)

Kodiak Archipelago Land Cover Classification:
Class 4 – Alpine tundra
Class 42 – Prostrate shrub tundra
(Fleming and Spencer, 2007)

Ecological site concept

Ecological Site characteristics:
• Supports a dwarf scrubland in the alpine above elevations of 2,000 feet
• Occurs on exposed, convex mountain summits, shoulders and upper backslopes
• Well drained soils have little to no development, with upwards of 50 percent rock fragments by volume in the subsurface soil horizons
• No site ponding or flooding, and no water table during the growing season
• Parent material is colluvium or residuum

Associated sites

R225XY333AK	**Southern Alaska Scrub Steep Backslopes** Low and mid elevation scrubland on steep mountain backslopes
R225XY334AK	**Southern Alaska Scrub Shallow Ashy Backslopes** Low and mid elevation scrubland on shallow soil backslopes
R225XY335AK	**Southern Alaska Tall Scrub Loamy Backslopes** Low and mid elevation scrubland on deep soil backslopes

Similar sites

R225XY333AK	**Southern Alaska Scrub Steep Backslopes** This scrubland on steep mountain backslopes is more prone to slope erosion. Less exposure, deeper soil, and less extreme climate influences allow greater shrub productivity.
R225XY334AK	**Southern Alaska Scrub Shallow Ashy Backslopes** Low and mid elevation scrubland on shallow backslopes

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Empetrum nigrum* (2) *Cassiope tetragona*

Herbaceous	(1) *Carex* (2) *Anthoxanthum monticola ssp. alpinum*

Physiographic features

This site occurs on convex mountain summits and shoulders. This site is exposed to wind. Site elevation is generally above 2,000 feet, but may be present on exposed, shallow soils at lower elevations. Slope gradients are generally strong to steep (12-15 percent). Flooding and ponding do not occur and there is no water table. This site generates runoff to adjacent, downslope sites.

Table 2. Representative physiographic features

Slope shape across	(1) Convex
Slope shape up-down	(1) Linear
Hillslope profile	(1) Summit (2) Shoulder
Landforms	(1) Mountains > Mountain slope
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	610–914 m
Slope	5–25%
Water table depth	152 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	152–1,524 m
Slope	0–70%
Water table depth	Not specified

Climatic features

The climate in this MLRA is shaped by the maritime influences of Bristol Bay to the west and the Pacific Ocean to the south. Cloudy days are the norm. Temperature and

precipitation are patterned around mountainous effects. Temperatures are typically cool throughout the year. The mean annual temperature at sea level is between 37 and 43 degrees Fahrenheit and generally decreases as elevation increases. Precipitation ranges from 30 inches along the coast to over 100 inches at high elevations. Snowfall ranges from 50 to 200 inches and supports glaciers and icefields at higher elevations (USDA-NRCS, 2022). Frost-free and freeze-free periods in the city of Kodiak are presented in the table below (WRCC, 2024). These periods shorten as elevation increases, culminating in the shortest frost-free and freeze-free periods in the alpine.

Table 4. Representative climatic features

Frost-free period (characteristic range)	124-156 days
Freeze-free period (characteristic range)	164-195 days
Precipitation total (characteristic range)	737-1,930 mm
Frost-free period (actual range)	121-167 days
Freeze-free period (actual range)	153-199 days
Precipitation total (actual range)	356-2,515 mm
Frost-free period (average)	140 days
Freeze-free period (average)	173 days
Precipitation total (average)	1,346 mm

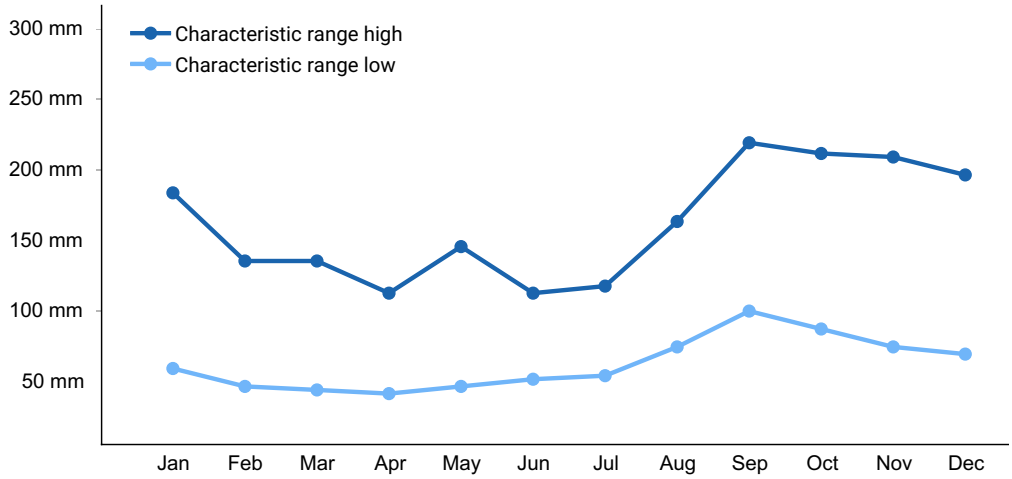

Figure 1. Monthly precipitation range

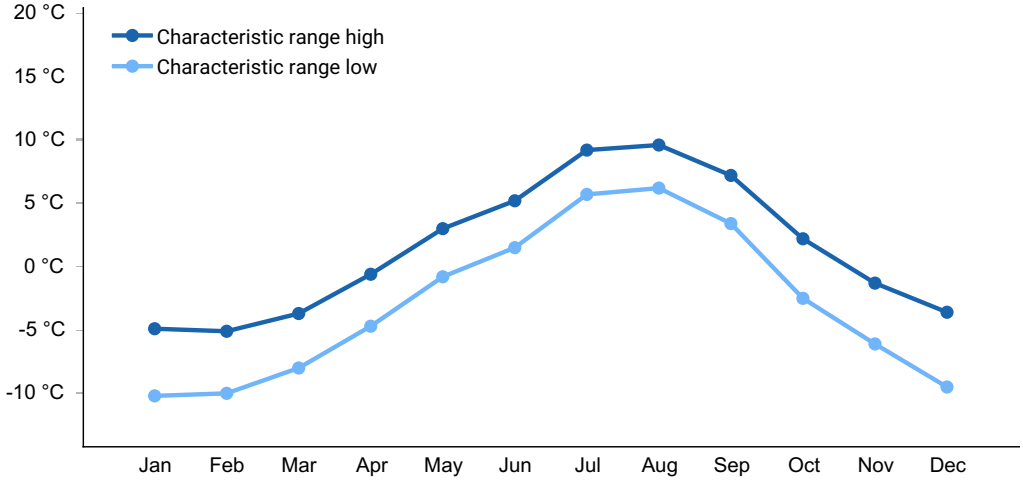

Figure 2. Monthly minimum temperature range

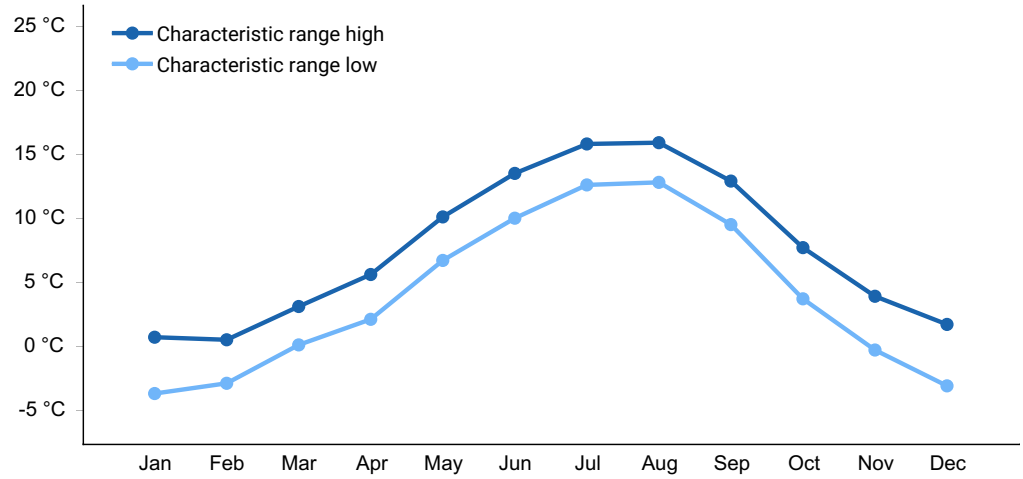

Figure 3. Monthly maximum temperature range

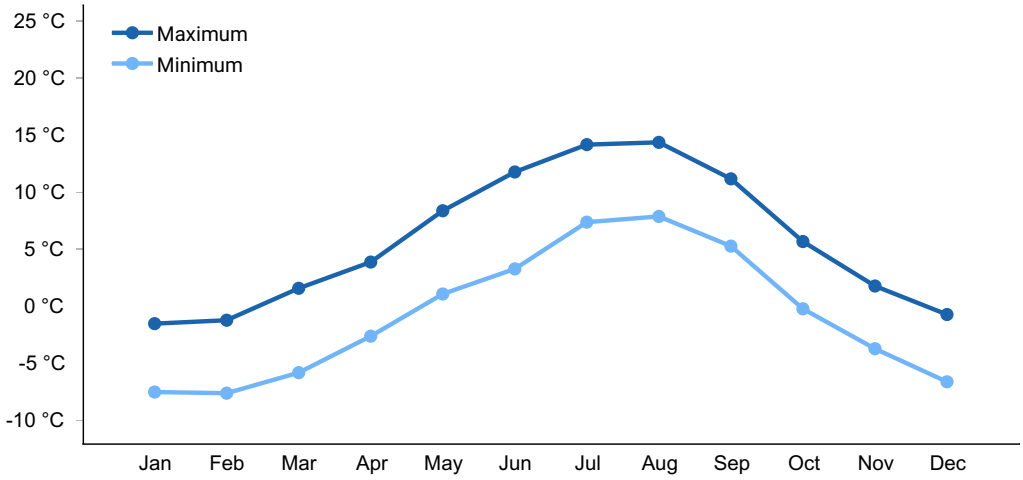

Figure 4. Monthly average minimum and maximum temperature

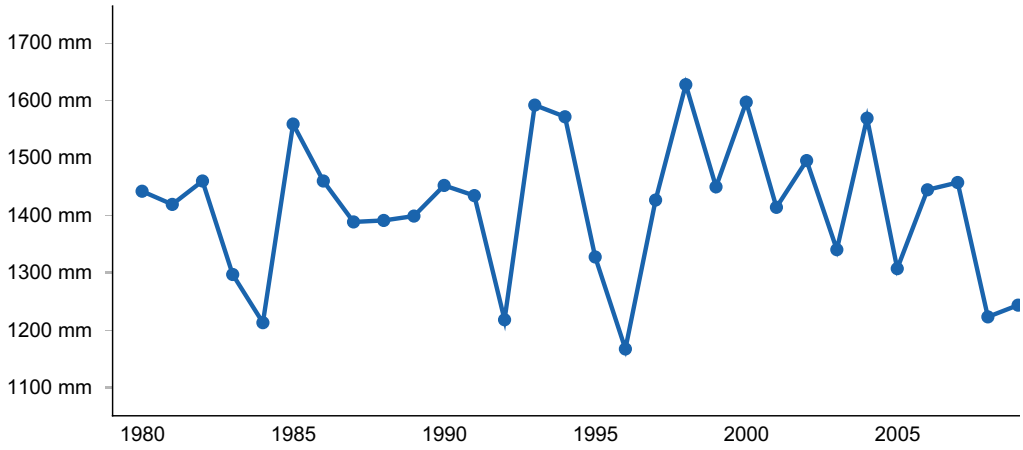

Figure 5. Annual precipitation pattern

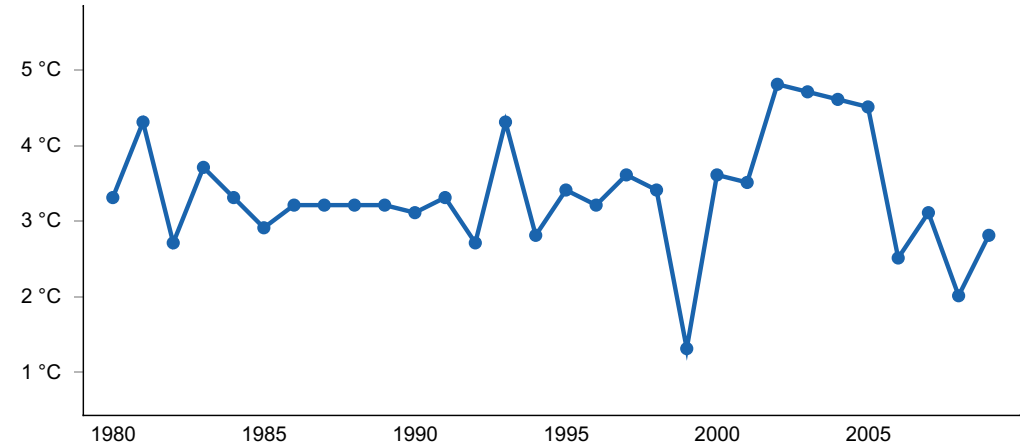

Figure 6. Annual average temperature pattern

Influencing water features

This site is not associated with or influenced by streams or wetlands. Precipitation and throughflow are the main source of water for this ecological site. Surface runoff and throughflow contribute water to downslope ecological sites.

Wetland description

This ecological site is not associated with wetlands.

Soil features

Soils are relatively undeveloped Entisols or Inceptisols (Soil Survey Staff, 2013). They formed from volcanic colluvium parent material. Permafrost is absent. Surface rock fragments are relatively high (5 – 20 percent). Subsurface fragments are about 50 percent by volume. Soil pH is strongly to slightly acidic. Soils are dry during the growing season.

Correlated soil components in MLRA 225X: E25-Maritime dwarf scrub-gravelly colluvial

slopes, E25-Maritime dwarf scrub-gravelly volcanic colluvial slopes

Table 5. Representative soil features

Parent material	(1) Colluvium (2) Residuum–sedimentary rock
Surface texture	(1) Gravelly, ashy loam (2) Gravelly loam (3) Ashy silt loam
Drainage class	Well drained
Permeability class	Moderate to rapid
Soil depth	152 cm
Surface fragment cover <=3"	2–9%
Surface fragment cover >3"	1–10%
Available water capacity (0-25.4cm)	1.02–3.56 cm
Soil reaction (1:1 water) (0-25.4cm)	4–6.6
Subsurface fragment volume <=3" (Depth not specified)	15–40%
Subsurface fragment volume >3" (Depth not specified)	9–40%

Ecological dynamics

The dwarf scrub reference plant community is shaped by local factors including cold temperatures, exposure, and a short growing season. Convex slopes are exposed to wind throughout the year, restricting plants to low-lying species. Additionally, a shortened growing season created by snow pack at high elevation combines with low temperatures throughout the growing season to support long lived, short growing shrubs, along with fast-growing wind-dispersed graminoids and forbs.

Site and soil conditions result in one community. Cooler temperatures and a shorter growing season support slow growing, often evergreen shrubs. Wind exposure limits plant height with most shrubs prostrate. Soils are weakly developed and rocky, but there is typically no root-limiting restrictive layer.

There is no recognized disturbance that shifts community composition on this ecological site. Wind scouring and erosion shape the vegetation and do not result in a unique, post-disturbance community. There is no known grazing or browsing.

The information in this Ecological Dynamics section, including the state-and-transition

model (STM), was developed based on current field data, professional experience, and a review of the scientific literature. As a result, all possible scenarios or plant species may not be included. Key indicator plant species, disturbances, and ecological processes are described to inform land management decisions.

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities

1.1. Black crowberry – mountain heather/sedge - alpine sweetgrass

State 1
Reference State

Figure 7. Dwarf scrubland in the alpine zone.

The reference state supports one community phase. The reference plant community is an ericaceous dwarf scrubland comprised of a mix of ericaceous and alpine species. All community phases in this report are characterized using the Alaska vegetation classification system (Viereck et al., 1992).

Dominant plant species

- black crowberry (*Empetrum nigrum*), shrub
- white arctic mountain heather (*Cassiope tetragona*), shrub
- arctic willow (*Salix arctica*), shrub
- alpine sweetgrass (*Anthoxanthum monticola ssp. alpinum*), grass
- sedge (*Carex*), grass

Community 1.1
Black crowberry – mountain heather/sedge - alpine sweetgrass

Figure 8. Close up of dwarf scrubland.

Figure 9. Alpine dwarf scrubland

The reference plant community is an ericaceous dwarf scrubland (Viereck et al., 1992). The major plant groups are dwarf shrubs, medium and low graminoids, and foliose lichens. This community supports a mix of ericaceous and alpine shrub species. Common shrub

species include black crowberry, mountain heather, arctic willow, Alaska bellheather, and alpine bearberry. Total graminoid cover is relatively low, but may include a diverse mix of species including sedges, alpine sweetgrass and woodrushes. Forb cover is low but may be diverse, particularly at the start of the growing season. Ground cover is comprised of lichens and surface rock fragments.

Dominant plant species

- white arctic mountain heather (*Cassiope tetragona*), shrub
- black crowberry (*Empetrum nigrum*), shrub
- arctic willow (*Salix arctica*), shrub
- alpine sweetgrass (*Anthoxanthum monticola ssp. alpinum*), grass
- sedge (*Carex*), grass
- Bigelow's sedge (*Carex bigelowii*), grass
- bellflower (*Campanula*), other herbaceous

Additional community tables

Inventory data references

Vegetative communities and transitions are described using existing models and expert knowledge. There are no vegetation inventory data points in NASIS associated with this ecological site.

External data sources:
The Alaska Vegetation Classification (Viereck et al., 1992)
The Alaska-Yukon Region of the Circumboreal Vegetation Map (CBVM) (Jorgensen and Meidinger, 2015)
LANDFIRE Biophysical Settings Models (Landfire, 2009)

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Western Regional Climate Center. 2024. “Kodiak WSO Airport, Alaska ‘Freeze Free’ Season Probabilities.” https://wrcc.dri.edu/cgi-bin/cliTFrezD.pl?akkodi. Accessed Sept 19, 2024.

Contributors

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Acknowledgments

This soil – ecological site correlation was reviewed by a workshop team during a February 2024 PES workshop in Wasilla, AK.

This ecological site description (ESD) fulfills the requirements of the Provisional Ecological Site (PES) national initiative. This ESD is published to fit current site-soil correlations as they are currently mapped and understood. Further data collection may provide the information to update this ESD from the provisional level to the approved level.

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	03/10/2026
Approved by	Blaine Spellman
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:**