Ecological site R237XY202AK
Western Alaska Maritime Mosaic Gravelly Slopes

Last updated: 7/23/2020
Accessed: 05/14/2025

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): 237X–Ahklun Mountains

The Ahklun Mountains Major Land Resource Area (MLRA 237) is in western Alaska (fig. 3). This MLRA covers approximately 14,555 square miles, and it includes the mountains, hills, and valleys of the Kilbuck Mountains in the north and the Ahklun Mountains in the south. Except for the Kilbuck Mountains and the highest ridges of the Ahklun Mountains, the MLRA was extensively glaciated during the Pleistocene (Kautz et al., 2004). Today, a few small glaciers persist in mountainous cirques (Gallant et al., 1995). The present-day landscape and landforms reflect this glacial history; glacial moraines and glacial drift cover much of the area (USDA-NRCS, 2006). The landscape of the MLRA is primarily defined by low, steep, rugged mountains cut by narrow-to-broad valleys. Flood plains and terraces of varying sizes are common at the lower elevations in the valley bottoms. Glacially carved valleys host many lakes. Togiak Lake is one of the largest lakes in the region. It is 13 miles long and about 9,500 acres in size. Major rivers include the Goodnews, Togiak, Kanektok, Osviak, Eek, and Arolik Rivers. Where the Goodnews and Togiak Rivers reach the coast, the nearly level to rolling deltas support numerous small lakes.

This MLRA has two distinct climatic zones: subarctic continental and maritime continental (fig. 4). The high-elevation areas are in the subarctic continental zone. The mean annual precipitation is more than 75 inches, and the mean annual air temperature is below about 27 degrees F (-3 degrees C) in extreme locations. The warmer, drier areas at the lower elevations are in the maritime continental zone. The mean annual precipitation is 20 to 50 inches, and the mean annual air temperature is about 30 to 32 degrees F (-0.2 to 1.2 degrees C) (PRISM). This climatic zone is influenced by both maritime and continental factors. The temperatures in summer are moderated by the open waters of the Bering Sea, and the temperatures in winter are more continental due to the presence of ice in the sea (Western Regional Climate Center, 2017). The seasonal ice reaches its southernmost extent off the coast of Alaska in Bristol Bay (Alaska Climate Research Center, 2017). The western coast of Alaska is also influenced by high winds from strong storms and airmasses in the Interior Region of Alaska (Hartmann, 2002).

The Ahklun Mountains MLRA is principally undeveloped wilderness. Federally managed lands include the Togiak and Alaska Maritime National Wildlife Refuges. The MLRA is sparsely populated, but it has several communities, including Togiak, Manokotak, Twin Hills, and Goodnews Bay. Togiak is the largest village. It has a population of approximately 855, most of which are Yup’ik Alaska Natives (U.S. Census Bureau, 2016). Major land uses include subsistence activities (fishing, hunting, and gathering) and wildlife recreation (USDA-NRCS, 2006; Kautz et al., 2004).

Ecological site concept

Site R237XY202AK is on backslopes and footslopes of hills and mountains in the maritime continental climate zone. It is on linear to concave slopes. The plants on these slopes differ markedly from those on linear to convex slopes. The soils associated with this site are well drained and moderately deep to very deep to lithic bedrock. The reference state supports a single community in a mosaic pattern. The processes underlying the mosaic pattern currently are unknown; however, it is hypothesized that soil temperature, snowpack, microtopography, and competition for nutrients and sunlight may play a role.

This site supports a tall closed scrubland (Viereck et al., 1992) comprised of alder and an understory of ferns and graminoids intermixed with an open low scrubland comprised of shrubs, graminoids, and forbs.

Associated sites

R237XY230AK	**Western Alaska Maritime Scrubland Silty Plains and Mountain Slopes, Lower** Ecological site R237XY202AK is extensive and is adjacent to or in close proximity to many other ecological sites. Other ecological sites on low-elevation mountains include R237XY204AK and R237XY230AK. These sites are differentiated by the location on the slope, the shape of the slope, or the location in the Ahklun Mountains area. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.
R237XY204AK	**Western Alaska Maritime Scrubland Loamy Slopes** Ecological site R237XY202AK is extensive and is adjacent to or in close proximity to many other ecological sites. Other ecological sites on low-elevation mountains include R237XY204AK and R237XY230AK. These sites are differentiated by the location on the slope, the shape of the slope, or the location in the Ahklun Mountains area. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.
R237XY201AK	**Western Alaska Maritime Scrubland Gravelly Slopes** Non-mountainous ecological sites associated with site R237XY202AK include R237XY201AK, R237XY203AK, R237XY205AK, R237XY206AK, R237XY210AK, R237XY211AK, R237XY217AK, R237XY218AK, and F237XY239AK. These sites typically are differentiated by one or more criteria, including landform, landform position, associated soils, disturbance regime, and the type and amount of plants.
R237XY203AK	**Western Alaska Maritime Scrubland Gravelly Drainage, Escarpment**
R237XY205AK	**Western Alaska Maritime Scrubland Loamy Swales** .
R237XY206AK	**Western Alaska Maritime Dwarf Scrubland Loamy Drainage, High Elevation**
R237XY210AK	**Western Alaska Maritime Scrubland Gravelly Flood Plains**
R237XY211AK	**Western Alaska Maritime Scrubland Loamy Flood Plains**
R237XY217AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, High Elevation**
R237XY218AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, Concave**
F237XY239AK	**Boreal Forest Loamy Slopes**

Similar sites

R237XY203AK	**Western Alaska Maritime Scrubland Gravelly Drainage, Escarpment** No other ecological sites in the Ahklun Mountains area support large areas of a mosaic plant community. Site R237XY203AK is on drainage escarpments and supports a reference plant community of dense alder. The location on the escarpments creates an early erosional sere, which is not in site R237XY202AK.
R237XY230AK	**Western Alaska Maritime Scrubland Silty Plains and Mountain Slopes, Lower** No other ecological sites in the Ahklun Mountains area support large areas of a mosaic plant community. Ecological site R237XY230AK supports an alder scrubland similar to that of community 1.1 in site R237XY202AK, but site R237XY230AK is differentiated by landform and soils. It is on moist plains and in lower mountain swales, and it does not have a mosaic reference state.

Figure 1. This ecological site extends across large areas of upland mountains and hills in the Ahklun Mountains area. The gray patches are partial defoliation of alder.

Figure 2. The patchwork of vegetation in this site is evident in the Ahklun Mountains area.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Alnus* (2) *Spiraea stevenii*
Herbaceous	(1) *Dryopteris expansa* (2) *Calamagrostis canadensis*

Physiographic features

Site characteristics specifically relate to the reference plant community phase. Each ecological site has a specific set of site characteristics and disturbance dynamics that results in a unique plant community composition, structure, and function. Site characteristics (climate, geology, topography, and soil characteristics) are dynamic across a landscape. Subtle changes in site characteristics can result in a different plant community phase or ecological site. Definitions of site characteristics are provided in the United States Department of Agriculture Handbook 296 (USDA-NRCS, 2006), Geomorphic Description System (Schoeneberger and Wysocki, 2012), Field Book for Describing and Sampling Soils (Schoeneberger et al., 2012), and Soil Survey Manual (Soil Science Division Staff, 2017).

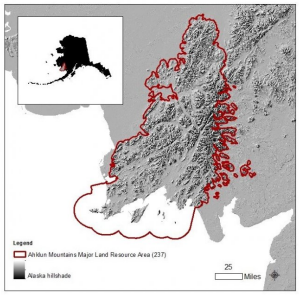

Figure 3. The Ahklun Mountains area (MLRA 237) is in western Alaska.

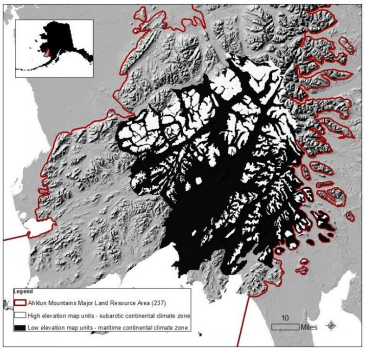

Figure 4. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 2. Representative physiographic features

Slope shape up-down	(1) Linear (2) Concave
Geomorphic position, hills	(1) Side Slope
Geomorphic position, mountains	(1) Upper third of mountainflank (2) Center third of mountainflank (3) Lower third of mountainflank
Slope shape across	(1) Concave (2) Linear
Landforms	(1) Mountains > Mountain slope (2) Hills > Hillslope
Flooding frequency	None
Ponding frequency	None
Elevation	5–975 m
Slope	5–85%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Climate of land resource region (LLR): Maritime continental (Western Regional Climate Center, 2017); short, warm summers and long, cold winters (USDA-NRCS, 2006)

Climate of major land resource area (MLRA): Maritime continental in the lowlands and subarctic continental at higher elevations. The mean annual precipitation is 20 to 30 inches in the lowlands, and it increases to more than 45 inches at the higher elevations. The mean annual air temperature along the coast is about 34 degrees F (1 degree C) (PRISM, 2014). Strong winds are common throughout the year.

Table 3. Representative climatic features

Frost-free period (characteristic range)	60-140 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

Influencing water features

Soil features

The well drained Ahklun, Klak, and Twinhills soils are correlated to this ecological site. The saturated hydraulic conductivity of the soils is moderately high to very high. The Ahklun soils are moderately deep to lithic bedrock, and the Twinhills soils are moderately deep to paralithic bedrock. The soils are strongly acid to extremely acid, which can influence the presence or absence of plants, particularly those in the alder understory.

Table 4. Representative soil features

Drainage class	Well drained
Depth to restrictive layer	51–130 cm

Ecological dynamics

Ecological site R237XY202AK is on mountain slopes and hillslopes in the maritime continental climate zone of the Ahklun Mountains area (figs. 1 and 2). The site is in linear to concave areas on backslopes of hills and mountains. The vegetation consists of a patterned community of tall and low scrub. Site R237XY204AK is in linear to convex areas on backslopes of mountains, and it supports a dwarf scrub community that thrives in exposed areas.

Site R237XY202AK supports one community that consists of a patchwork of tall and low scrub. The mosaic pattern is not predictable by landform or known abiotic factors. No major disturbance regimes were observed in this ecological site, but competition among species in the areas of tall and low scrub is hypothesized. Alder (Alnus spp.) is an important colonizer in Alaska (Talbot et al., 2005), and it is suspected to be a community driver on these slopes. Alder thrives in nutrient-poor soils. It can fix nitrogen and be supported by a shallow root system; thus, it is an excellent competitor for space and light on rocky slopes. Notably, this ecological site is on south-facing slopes. This is likely because of the higher soil temperatures and longer growing season on these slopes as compared to north-facing slopes.

Disturbance Dynamics

Major disturbances were not observed in this ecological site. It is hypothesized that factors such as slope erosion and small landslides, microtopography, soil temperature, snowpack, and competition for nutrients and sunlight may play a role in creating the patterned vegetation. Areas that support more alder appear to expand outward into areas of open low scrub where the alder can compete for light and space. Bluejoint commonly forms a dense monotypic ring around the outer edge of alder patches, presumably to take advantage of the increased nitrogen in the soils and increased moisture from a deeper snowpack. This ring of bluejoint may hinder the expansion of alder because it prefers open, sunlit areas (Darris and Gonzalves, 2009). Conversely, low scrub may spread into an existing alder community when the alder dies back (fig. 1). This continued competition prevents one vegetation type from becoming dominant. Future research is needed to test these hypotheses.

Fire

Some evidence of fire was recorded in situ. Charcoal was observed in the soil profile at two locations, which

suggests that a fire occurred during the previous 10 to 50 years. The vegetation in areas where charcoal was observed does not differ from that in areas where no charcoal was observed. Further investigation is needed to determine the full effects of fire on this ecological site.

Other Observations

Slight browsing by moose and hare on willow and other shrubs was recorded. Browsing is not considered severe enough to result in a phase or state transition.

No alternate states were observed for this ecological site.

State and transition model

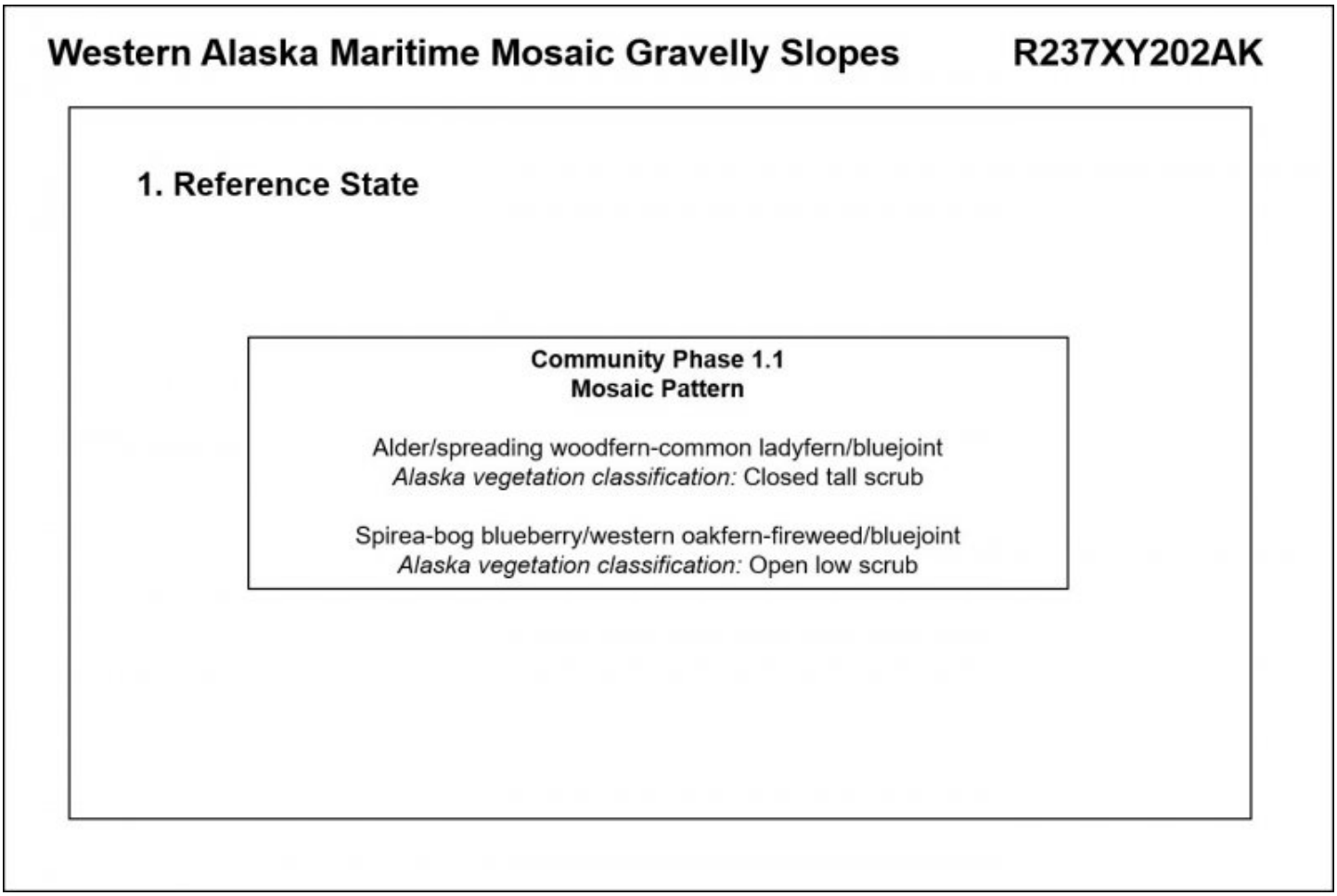

Figure 5. State-and-transition model.

State 1
Reference State

The reference state supports one community phase that consists of a patchwork of tall and low shrubs (fig. 5). This mosaic pattern presently cannot be predicted by landform, abiotic features, or disturbance regime. This report provides baseline vegetation inventory data. Future data collection is needed to provide further information about existing plant communities and possible disturbance regimes that may result in transitions from one community to another. All community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1
Alder-spirea/spreading woodfern-common ladyfern/bluejoint (Alnus spp.-Spiraea stevenii/Dryopteris expansa-Athyrium filix-femina/Calamagrostis canadensis)

Figure 6. Typical area of tall closed scrub.

Figure 7. Typical area of open low scrub.

Community Phase 1.1 Canopy Cover Table

Vegetation data are aggregated across modal sample plots for this community phase and are provided as a frequency (percent) and mean canopy cover (percent) of the dominant and most ecologically relevant species. Canopy cover is represented as a mean with the range in parentheses.

Plant group	Common name	Scientific name	USDA plant code	Frequency (percent)	Mean canopy cover (percent)
S	Sitka alder	*Alnus viridis* ssp. *sinuata*	ALVIS	55	35 (0-95)
S	Thinleaf alder	*Alnus incana* ssp. *tenuifolia*	ALINT	20	7 (0-80)
S	Spirea	*Spiraea stevenii*	SPST3	60	12 (0-70)
G	Bluejoint	*Calamagrostis canadensis*	CACA4	100	20 (0.1-55)
F	Spreading woodfern	*Dryopteris expansa*	DREX2	65	25 (0-85)
F	Common ladyfern	*Athyrium filix-femina*	ATFI	30	20 (0-90)

This dataset includes data from 22 sample plots. The plots are distributed across the Ahklun Mountains and are independent of one another.

Plant functional group classifications—T = trees, S = shrubs, G = graminoids, F = forbs, B = bryophytes, L = lichens

Canopy cover data are based on ocular estimates and rounded, except trace (0.1 percent) cover. Data ranging from 1 to 9 percent cover are rounded to the nearest integer. Data ranging from 10 to 100 percent cover are rounded to the nearest factor of 5.

Figure 8. Canopy cover and frequency of species in community phase 1.1.

This community consists of mixed patches of closed tall scrub (fig. 6) (Viereck et al., 1992) and open low scrub (fig. 7). The areas of tall closed scrub have strata of medium shrubs (3 to 10 feet in height), tall shrubs (more than 10 feet), medium and tall forbs (4 to 24 inches or more), and tall graminoids (more than 24 inches). The areas of open low scrub have strata of low shrubs (8 to 36 inches in height), medium and tall forbs (4 to 24 inches or more), and tall graminoids (more than 24 inches). Major species are alder (Alnus spp.), spirea (*Spiraea stevenii*), bluejoint (*Calamagrostis canadensis*), and ferns such as common ladyfern (*Athyrium filix-femina*) and spreading woodfern (*Dryopteris expansa*) (fig. 8). Other species include fireweed (*Chamerion angustifolium*), bog blueberry (*Vaccinium uliginosum*), arctic starflower (*Trientalis europaea*), and western oakfern (*Gymnocarpium dryopteris*).

Additional community tables

Other references

Alaska Climate Research Center. 2017. Climatological data–Bristol Bay. http://oldclimate.gi.alaska.edu. Accessed September 19, 2017.

Darris, D., and P. Gonzalves. 2009. Plant fact sheet for Sitka alder (Alnus viridis ssp. sinuata). U.S. Department of Agriculture, Natural Resources Conservation Service, Plant Materials Center, Corvallis, OR.

Gallant, A.l., E.F. Binnian, J.M. Omernik, and M.B. Shasby. 1995. Ecoregions of Alaska. U.S. Geological Survey Professional Paper 1567. Government Printing Office, Washington, D.C.

Hartmann, B. 2002. Climate regions of Alaska. The Alaska Climate Research Center. http://oldclimate.gi.alaska.edu/ClimTrends/30year/regions1.html. Modified August 28, 2002. Accessed September 19, 2017.

Kautz, D.R., P. Taber, and S. Nield (editors). 2004. Land resource regions and major land resource areas of Alaska. U.S. Department of Agriculture, Natural Resources Conservation Service, Palmer, AK. Revised 2012.

PRISM Climate Group. 2014. PRISM climate data. Oregon State University. http://prism.oregonstate.edu. Accessed March 27, 2018.

Schoeneberger, P.J., and D.A. Wysocki. 2012. Geomorphic description system. Version 4.2. U.S. Department of Agriculture, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils. Version 3.0. U.S. Department of Agriculture, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

Soil Science Division Staff. 2017. Soil survey manual. Ditzler, C., K. Scheffe, and H.C Monger, editors. U.S. Department of Agriculture Handbook 18. Government Printing Office, Washington, D.C.

Talbot, S.S., S.L. Talbot, and F.J.A. Daniels. 2005. Comparative phytosociological investigation of subalpine alder thickets in Southwestern Alaska and the North Pacific. Phytocoenologica 35(4):727-759.

U.S. Census Bureau. 2016. Vintage 2016 population estimates: Population estimates. https://www.census.gov. Accessed August 14, 2017.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053624. Accessed March 28, 2019.

Viereck, L.A., C.T. Dyrness, A.R. Batten, and K.J. Wezlick. 1992. The Alaska vegetation classification. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station General Technical Report PNW-GTR-286. Portland, OR.

Western Regional Climate Center. 2017. Climate of Alaska. http://wrcc.dri.edu. Accessed September 19, 2017.

Contributors

Kendra Moseley
Michael Margo
Stephanie Schmit
Sue Tester
Charlotte Crowder

Approval

Michael Margo, 7/23/2020

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	05/14/2025
Approved by	Michael Margo
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:**