Ecological site R237XY215AK
Western Alaska Maritime Scrubland Loamy Plains

Last updated: 7/23/2020
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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): 237X–Ahklun Mountains

The Ahklun Mountains Major Land Resource Area (MLRA 237) is in western Alaska (fig. 2). 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. 3). 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

Ecological site R237XY215AK is on low-elevation, convex rises of drift plains. The reference state has one community phase, which is the reference plant community. No disturbance has been recorded for this site, and no alternate states are associated with the site.

The reference plant community is an ericaceous dwarf scrubland tundra (Viereck et al., 1992) consisting of dwarf and low shrubs. Major species include black crowberry (*Empetrum nigrum*), marsh Labrador tea (*Ledum palustre*

ssp. decumbens), bog blueberry (Vaccinium uliginosum), and dwarf birch (Betula nana). The ground cover commonly consists of various lichens.

Associated sites

R237XY236AK	**Western Alaska Maritime Graminoid Peat Plains** Ecological site R237XY215AK is on convex rises of plains. Many ecological sites are directly adjacent to or in close proximity of this site. These sites typically are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants. The most common associated ecological sites are R237XY205AK, R237XY208AK, and R237XY236AK. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.
R237XY205AK	**Western Alaska Maritime Scrubland Loamy Swales** Ecological site R237XY215AK is on convex rises of plains. Many ecological sites are directly adjacent to or in close proximity of this site. These sites typically are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants. The most common associated ecological sites are R237XY205AK, R237XY208AK, and R237XY236AK. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.
R237XY208AK	**Western Alaska Maritime Scrubland Peat Depressions** Ecological site R237XY215AK is on convex rises of plains. Many ecological sites are directly adjacent to or in close proximity of this site. These sites typically are differentiated by one or more criteria, including landform, landform position, associated soils, associated disturbance regimes, and the type and amount of plants. The most common associated ecological sites are R237XY205AK, R237XY208AK, and R237XY236AK. Ecotonal plant communities that have characteristics from more than one ecological site are in areas where these sites abut.ological site are in areas where these sites abut.

Similar sites

R237XY201AK	**Western Alaska Maritime Scrubland Gravelly Slopes** Ecological site R237XY201AK supports some of the same low and dwarf shrub species as site R237XY215AK, but the reference plant communities of these sites differ. Site R237XY201AK supports less total cover of shrubs and lichens than does site R237XY215AK. Site R237XY215AK also is subject to a disturbance and supports a plant community that is not recorded on the rises of plains.
R237XY204AK	**Western Alaska Maritime Scrubland Loamy Slopes** Ecological sites R237XY215AK and R237XY204AK support many of the same species in the reference plant community, but shrubs appear to be more productive in areas of site R237XY204AK (personal observation). Climatic differences likely contribute to the differences in production.
R237XY218AK	**Western Alaska Maritime Dwarf Scrubland Gravelly Slopes, Concave** Ecological sites R237XY215AK and R237XY218AK supports a similar reference plant community; however, site R237XY218AK is in concave areas at higher elevations. Alpine and subalpine plants are interspersed throughout the dwarf scrubland in this site. Site R237XY218AK also supports less lichen than site R237XY215AK and likely is more productive (personal observation), which may be due to the protection provided by the concave shape of the slopes.

Figure 1. This ecological site dominantly supports low and dwarf shrubs. Various lichens make up the ground cover.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Empetrum nigrum* (2) *Ledum palustre subsp. decumbens*
Herbaceous	(1) *Cladina* (2) *Flavocetraria*

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).

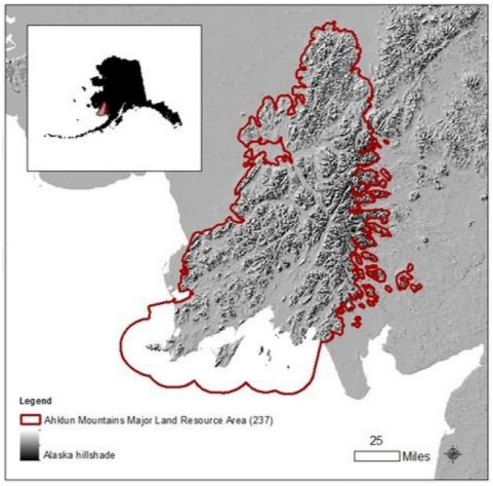

Figure 2. The Ahklun Mountains area (MLRA 237) is in western Alaska.

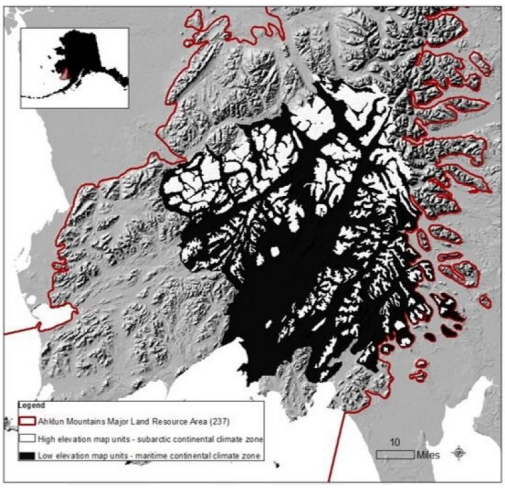

Figure 3. High-elevation and low-elevation map units in the area, which illustrate the primary climatic influence.

Table 2. Representative physiographic features

Slope shape across	(1) Convex
Slope shape up-down	(1) Convex

Geomorphic position, flats	(1) Rise
Landforms	(1) Plains > Plain
Flooding frequency	None
Ponding frequency	None
Elevation	5–30 m
Slope	0–5%
Water table depth	46–66 cm
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)	85-140 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	

Influencing water features

Soil features

Well drained Cryands are correlated to this ecological site. The saturated hydraulic conductivity of these soils increases from moderately high to very high as depth increases. The upper part of the mineral soil is strongly acid, and the loamy-skeletal lower part is slightly acid.

Table 4. Representative soil features

Drainage class	Well drained

Ecological dynamics

Slightly convex rises, rolling areas, and linear areas of glaciated plains and outwash terraces are throughout the Ahklun Mountains area. Site R237XY215AK is on the slightly convex rises of the plains. The disturbance regimes and soil characteristics create a unique vegetative community on the rises (fig. 1).

Site R237XY215AK is on rises of plains in the southern third of the Ahklun Mountains area. The convex slope, exposure, and soil characteristics contribute to the existing plant communities. The soils are cool and acidic and have a strongly contrasting particle-size class, which may impede the movement of water through the profile. Because the rises are slightly convex, they are stable and unlikely to undergo major disturbances such as erosion. The upper part of the soils is strongly acid, which is typical in areas of ericaceous plant communities (Viereck et al., 1992). Low soil pH, dense vegetation, ready removal of water from the soils, and allelopathic effects associated with the Empetrum genus may prevent colonization by herbaceous plants and larger shrubs (Bråthen et al., 2010; Swanson, 2015). Natural variation in plant richness and cover may be evident among areas supporting this ecological site.

Disturbance Dynamics

This ecological site is in relatively stable landscape positions. Disturbances resulting in community phase or state transitions were not observed. Anthropogenic disturbances that remove vegetation, such as construction of trails, may promote further disturbances such as erosion. These disturbances could alter the reference plant community and result in a different plant community, but this was not recorded in situ.

Wind erosion
During coastal storms, the rises are exposed to climatic features such as strong wind. Plant morphology, particularly the dense, short vegetation, prevents this disturbance from surpassing the resilience threshold required to cause a shift in the community.

Other Observations
The convex slope and ready removal of water from the soils normally prohibit the creation of earth hummocks on this ecological site. The contrasting soil textures (medial and loamy-skeletal) and soil moisture (well drained and moderately high saturated hydraulic conductivity) do not favor the formation of earth hummocks as in other areas of plains; however, earth hummocks may be in small areas that are less sloping and wetter. The increase in soil moisture likely drives the formation of earth hummocks in these areas (Grab, 2005). Earth hummocks make up a small percentage of the total area of the ecological site, and the plant communities are similar in the micro-low and micro-high positions.

No evidence of browsing or grazing by any animals was observed in this ecological site.

No alternate states were observed for this ecological site. The site may be used for low-impact human activities, such as berry picking, but these activities are not expected to influence the site.

State and transition model

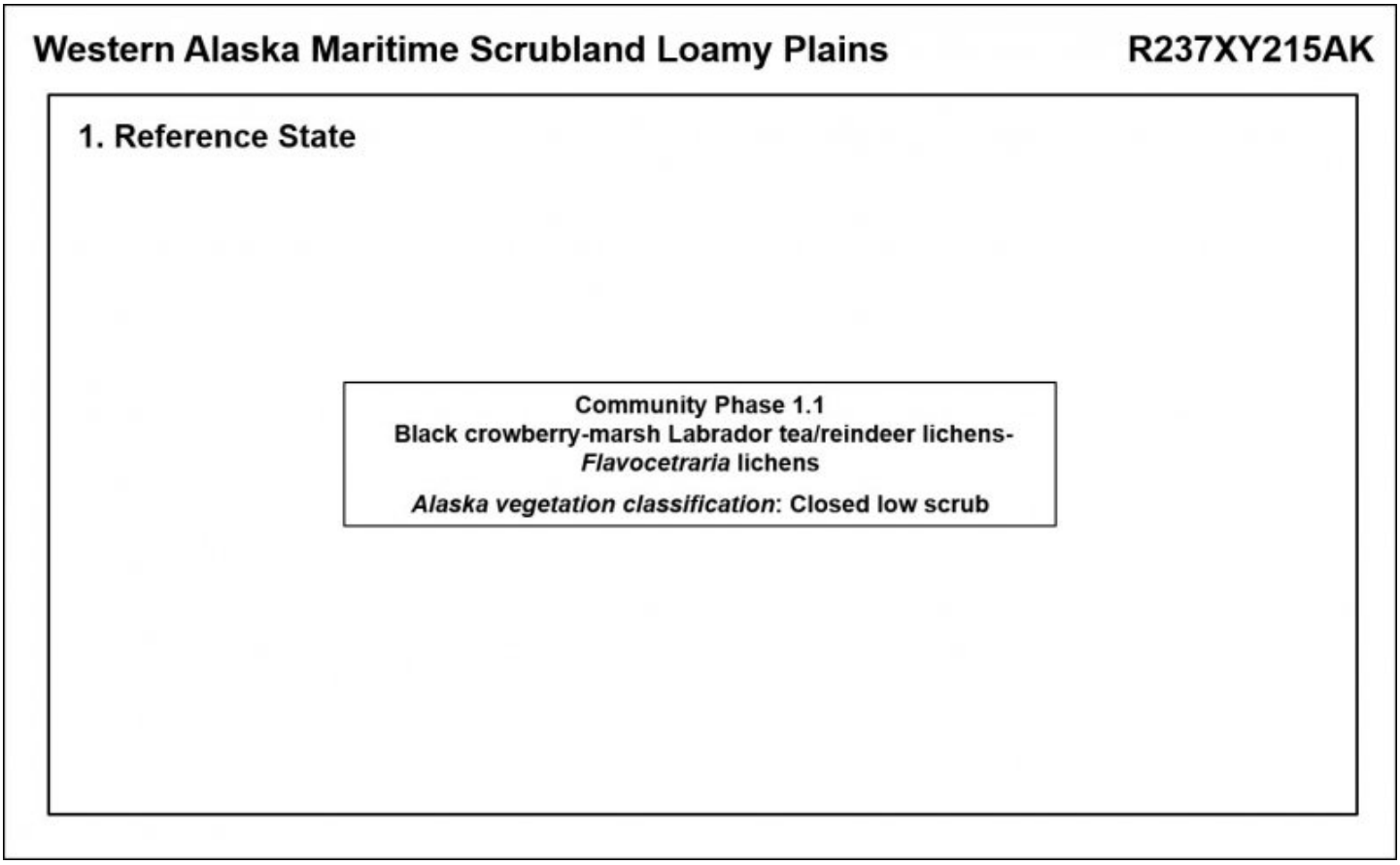

Figure 4. State-and-transition model.

State 1
Reference State

The reference state supports one community phase that is distinguished by the developed structure and dominance of the vegetation and the ecological function and stability of the community (fig. 4). The reference community phase is scrubland consisting of shrubs and lichen. This report provides baseline vegetation inventory data. Future data collection is needed to provide further information about existing plant communities. Common and scientific names in this report are from the USDA PLANTS database. Community phases are characterized by the Alaska Vegetation Classification System (Viereck et al., 1992).

Community 1.1
Black crowberry-marsh Labrador tea/reindeer lichens-Flavocetraria lichens (Empetrum nigrum-Ledum palustre ssp. decumbens/Cladina spp.-Flavocetraria spp.)

Figure 5. Typical area of plant community 1.1.

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	Black crowberry	*Empetrum nigrum*	EMNI	100	50 (45-60)
S	Marsh Labrador tea	*Ledum palustre* ssp. *decumbens*	LEPAD	100	15 (1-40)
S	Bog blueberry	*Vaccinium uliginosum*	VAUL	100	6 (3-10)
S	Dwarf birch	*Betula nana*	BENA	100	2 (0.1-6)
S	Alpine bearberry	*Arctostaphylos alpina*	ARAL2	67	3 (0-7)
L	Reindeer lichens^	*Cladina* spp.	CLADI3	100	25 (9-40)
L	Greygreen reindeer lichen	*Cladina rangiferina*	CLRA60	100	15 (6-25)
L	Star reindeer lichen	*Cladina stellaris*	CLST60	100	7 (3-15)
L	Flavocetraria lichens	*Flavocetraria* spp.	FLAVO3	100	8 (1-20)

^Reindeer lichens (*Cladina* spp.) includes all reindeer lichens, including greygreen reindeer lichen and star reindeer lichen.

This dataset includes data from three sample plots. The plots are distributed across the Ahklun Mountains area and are independent of one another. Due to the limited data available for this plant community phase, personal field observations were used to aid in describing the community.

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 6. Canopy cover and frequency of species in community 1.1.

The reference plant community is characterized as closed low scrub (fig. 5) (Viereck et al., 1992). The major functional plant groups are dwarf shrubs (less than 8 inches in height), lichens, low shrubs (8 to 36 inches), and mosses (fig. 6). The plant community typically consists of black crowberry, marsh Labrador tea, bog blueberry, and dwarf birch interspersed with large areas of reindeer lichens (Cladina spp.) and Flavocetraria lichens (Flavocetraria spp.). Less common shrubs include Lapland cornel (*Cornus suecica*), lingonberry (*Vaccinium vitis-idaea*), and arctic willow (*Salix arctica*). Sporadic forbs and graminoids may be present. The ground cover commonly includes lichens, mosses, and herbaceous litter.

Additional community tables

Other references

Alaska Climate Research Center. 2017. Climatological data – Bristol Bay. Available at http://oldclimate.gi.alaska.edu (accessed 19 Sep. 2017).

Alaska Interagency Coordination Center (AICC). Available at https://fire.ak.blm.gov/predsvcs/maps.php (accessed 16 Aug. 2017).

Bråthen, K.A., C.H. Fodstad, and C. Gallet. 2010. Ecosystem disturbance reduces the allelopathic effects of Empetrum hermaphroditum humus on tundra plants. J. Veg. Sci. 21:786—795.

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

Grab, S. 2005. Aspects of the geomorphology, genesis and environmental significance of earth hummocks (thufur, pounus): miniature cryogenic mounds. Prog. Phys. Geogr. 29(2):139—155.

Hartmann, B. 2002. Climate regions of Alaska. The Alaska Climate Research Center. Available at http://oldclimate.gi.alaska.edu/ClimTrends/30year/regions1.html (modified 28 Aug. 2002; accessed 19 Sep. 2017).

Kautz, D.R., P. Taber, and S. Nield (eds.) 2004. Land Resource Regions and Major Land Resource Areas of Alaska. USDA-NRCS, Palmer, AK (revised 2012).

PRISM Climate Group. 2014. PRISM climate data. Oregon State University. Available at http://prism.oregonstate.edu (accessed 27 Mar. 2018).

Schoeneberger, P.J., and D.A. Wysocki. 2012. Geomorphic Description System, Version 4.2. NRCS 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. NRCS National Soil Survey Center, Lincoln, NE.

Soil Science Division Staff. 2017. Soil survey manual. Ditzler, C., K. Scheffe, and H.C Monger (eds.) USDA Handbook 18. Government Printing Office, Washington, D.C.

Swanson, D.K. 2015. Environmental limits of tall shrubs in Alaska's arctic National Parks. Liang E., ed. PloS ONE. 10(9):e0138387.

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.

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.

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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	05/17/2024
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):**

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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):**

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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:**

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17. **Perennial plant reproductive capability:**
