USDA Natural Resources Conservation Service

Ecological site R006XA308OR
Moist Scabland 14-18 PZ

Last updated: 9/11/2023
Accessed: 05/19/2024

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): 006X–Cascade Mountains, Eastern Slope

Stretching from northern Washington to southern Oregon, MLRA6 encompasses the mountain slopes, foothills, elevated plateaus and valleys on the eastern slopes of the Cascade mountains. This MLRA is a transitional area between the Cascade Mountains to the west and the lower lying Columbia Basalt Plateau to the east. Situated in the rain shadow of the Cascade Crest, this MLRA receives less precipitation than portions of the cascades further west and greater precipitation than the basalt plateaus to the east. Geologically, the majority of the MLRA is dominated by Miocene volcanic rocks, while the northern portion is dominated by Pre-Cretaceous metamorphic rocks and the southern portion is blanketed with a thick mantle of ash and pumice from Mount Mazama. The soils in the MLRA dominantly have a mesic, frigid, or cryic soil temperature regime, a xeric soil moisture regime, and mixed or glassy mineralogy. They generally are moderately deep to very deep, well drained, and loamy or ashy. Biologically, the MLRA is dominated by coniferous forest, large expanses of which are dominated by ponderosa pine, Douglas-fir or lodgepole pine. Areas experiencing cooler and moister conditions include grand fir, white fir, and western larch while the highest elevations include pacific silver fir, subalpine fir and whitebark pine. Economically, timber harvest and recreation are important land uses in these forests. Historically, many of these forests would have experienced relatively frequent, low and mixed severity fire favoring the development of mature forests dominated by ponderosa pine or Douglas-fir. In the southern pumice plateau forests, less frequent, higher severity fire was common and promoted the growth of large expanses of lodgepole pine forests.

LRU notes

This unit is characterized by ash mantled lava flows and glacial outwash plains on lower mountain slopes and foothills of the East Cascades in Oregon. Vegetation is largely dominated by forests of ponderosa pine with transitional dry mixed conifer forests where Douglas-fir and grand fir are sub dominant occurring in areas with greater effective precipitation. Historically, these forests have been influenced by a fire regime whereby frequent to moderately frequent, low and mixed severity fires would have favored the development of open stands of mature ponderosa pine. The climate of this unit is cool and dry with a predominately xeric soil moisture regime and frigid soil temperature regime. Geologically, underlying lithologies are dominated by Quaternary and late Tertiary basalt and basaltic andesite as well as mixed grain sediments deposited during Pleistocene glacial retreat. Unlike the nearby pumice plateau, this unit lacks the coarse pumice fragments that dominate the soil profile and cooler temperatures that favor lodgepole pine. This unit is south of the climate influences of the Columbia gorge and therefore does not support woodlands of Oregon white oak.

Ecological site concept

This site represents a shallow scabland site at the transition zone between the foothills of the Oregon east cascades and the Columbia plateau. This is a low productivity site with a reference plant community dominated by onespike oatgrass (Danthonia unispicata). This site often occurs within mound - intermound topography where it occupies the interspaces between raised mounds. Raised mounds and adjacent forest and woodland sites will often support plant communities with higher diversity and may include shrubs, trees and greater composition of deep-

rooted perennial grasses.

This is a provisional ecological site and is subject to extensive review and revision before final approval. All data herein should be considered provisional and contingent upon field validation prior to use in conservation planning.

Development of this site as a range site was based on field data collection completed in 1996. It was revised and updated with information regarding ecological dynamics in 2020.

Associated sites

R006XB208OR	**Shallow Slopes 14-20 PZ** Adjacent south slopes, shrubs common
R006XA310OR	**Juniper-Oak Clayey** Deeper soils, clayey textures, JUOC common

Similar sites

R006XB208OR	**Shallow Slopes 14-20 PZ** Steeper south slopes, higher elevation range
R006XA310OR	**Juniper-Oak Clayey** Deeper, clayey soils

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Danthonia unispicata* (2) *Poa secunda*

Physiographic features

This site occurs on level plains, plateaus and other gently sloping areas. Often it is the low intermound area in patterned ground. Theories surrounding the creation of these patterned landscapes range from faunal, erosional/depositional and periglacial processes (Washburn 1988). Slopes range from 0 to 12 percent. Elevations are typically between 2,500 and 3,000 feet (800 to 950 meters) but may extend up to 3,500 feet (1,075 meters). This site is found on all aspects. This site is not subject to ponding or flooding and no water table is present within the upper 100 inches of soil.

Table 2. Representative physiographic features

Landforms	(1) Plateaus or tablelands > Depression (2) Plateaus or tablelands > Plain
Flooding frequency	None
Ponding frequency	None
Elevation	762–914 m
Slope	0–12%
Ponding depth	0 cm
Water table depth	254 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	Not specified
Ponding frequency	Not specified

Elevation	762–1,143 m
Slope	Not specified
Ponding depth	Not specified
Water table depth	Not specified

Climatic features

This site has a xeric soil moisture regime with mean annual precipitation ranging from 14 to 18 in (350 to 450 mm), most of which occurs during the months of October through June in the form of rain and snow. The soil temperature regime is mesic with a mean annual air temperature of about 48 degrees Fahrenheit (9 degrees C). Historical temperature extremes range from -16 to 103 degrees F (-27 to 39 degrees C). The frost-free period ranges from about 90 to 120 days. The optimum period for plant growth is from April through June. The graphs below are populated from the closest available weather station to representative site locations and are provided to indicate general climate patterns.

Table 4. Representative climatic features

Frost-free period (characteristic range)	90-120 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	356-457 mm
Frost-free period (average)	105 days
Freeze-free period (average)	
Precipitation total (average)	406 mm

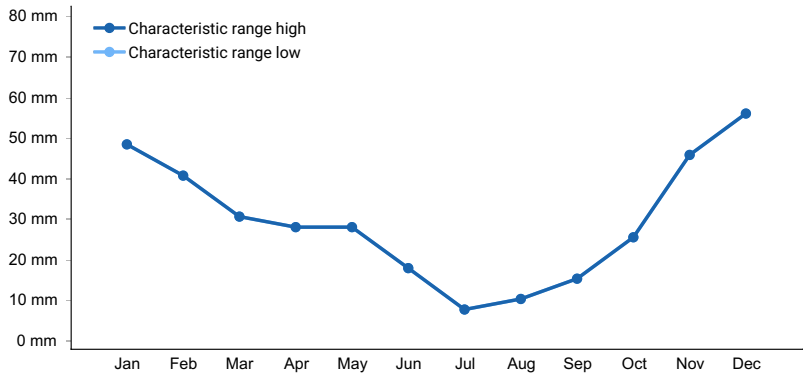


Figure 1. Monthly precipitation range

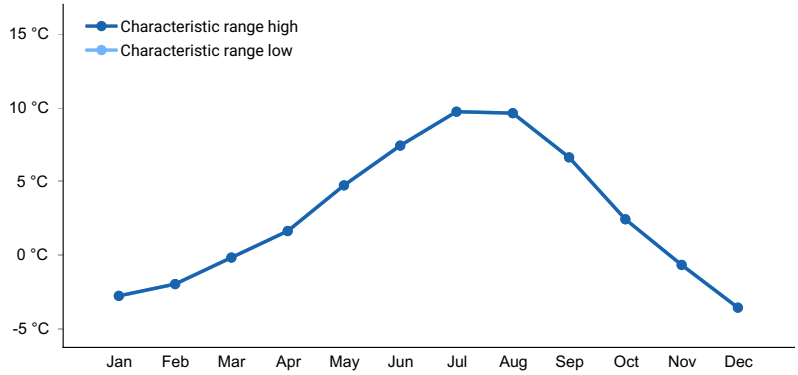


Figure 2. Monthly minimum temperature range

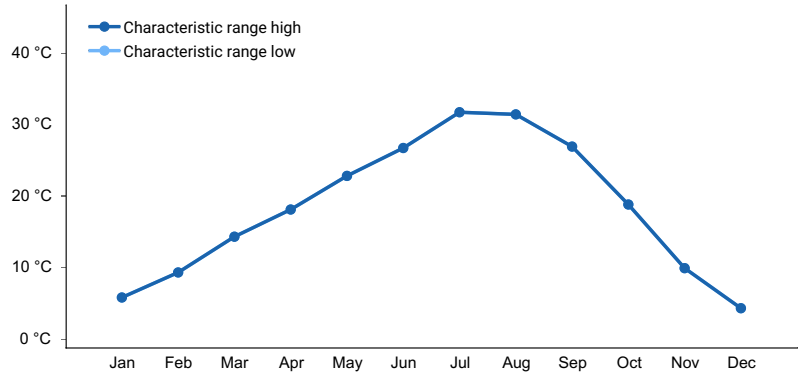


Figure 3. Monthly maximum temperature range

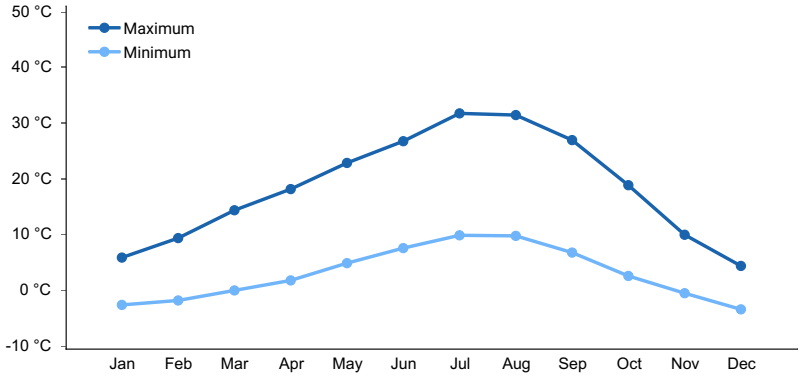


Figure 4. Monthly average minimum and maximum temperature

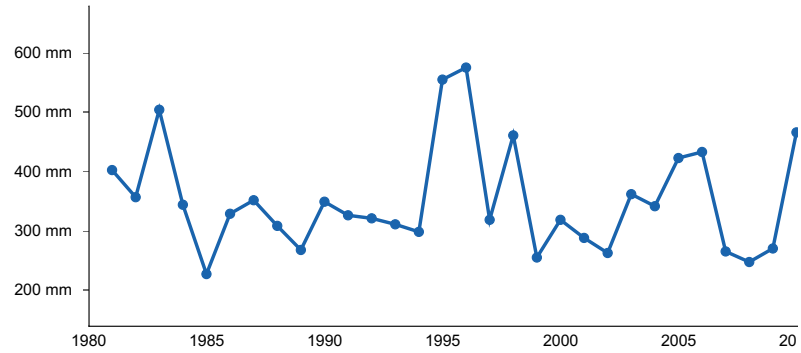


Figure 5. Annual precipitation pattern

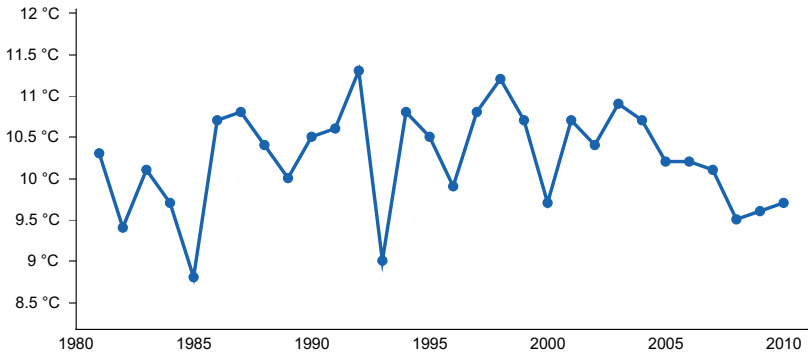


Figure 6. Annual average temperature pattern

Climate stations used

- (1) DUFUR [USC00352440], Dufur, OR

Influencing water features

This site is not influenced by water from a wetland or stream.

Wetland description

N/A

Soil features

The soils that typify this site concept are shallow, well drained and moderately fine textured. They are generally formed in loess, volcanic ash and basalt colluvium. Surface textures are commonly cobbly loams over extremely cobbly loams or clay loams. Permeability is moderate and the available water holding capacity is 1 to 3 inches for the profile. The potential for wind or water erosion is low.

Table 5. Representative soil features

Parent material	(1) Volcanic ash (2) Loess (3) Colluvium–basalt
Surface texture	(1) Cobbly loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	25–51 cm
Soil depth	25–51 cm
Surface fragment cover <=3"	0–45%
Surface fragment cover >3"	0–45%
Available water capacity (0-50.8cm)	2.54–7.62 cm
Soil reaction (1:1 water) (0-50.8cm)	6.6–7.3
Subsurface fragment volume <=3" (10.2-50.8cm)	10–40%
Subsurface fragment volume >3" (10.2-50.8cm)	10–40%

Ecological dynamics

Reference Plant community:

The Reference Native Plant Community is dominated by one-spike oatgrass. Sandberg bluegrass (*Poa secunda*) and bottlebrush squirreltail (*Elymus elymoides*) are common. Bluebunch wheatgrass (Pseudoregenaria spicata), Idaho fescue (*Festuca idahoensis*), prairie junegrass (*Koeleria macrantha*) and rushes (Juncus spp.) occur in minor amounts. Some perennial forbs can be found such as yampa (*Perideridia gairdneri*), lomatium (Lomatium spp.), pearly everlasting (*Anaphalis margaritacea*) and serrate balsamroot (*Balsamorhiza serrata*). Shrubs are minor in the stand and include buckwheat (Erioganum spp.) plus incidental occurrences of bitterbrush (*Purshia tridentata*). Vegetative composition is approximately 85 percent grasses, 10 percent forbs, and 5 percent shrubs. Wetter areas and northerly aspects within the timber zone have more oatgrass, whereas drier areas have more Sandberg bluegrass and less oatgrass.

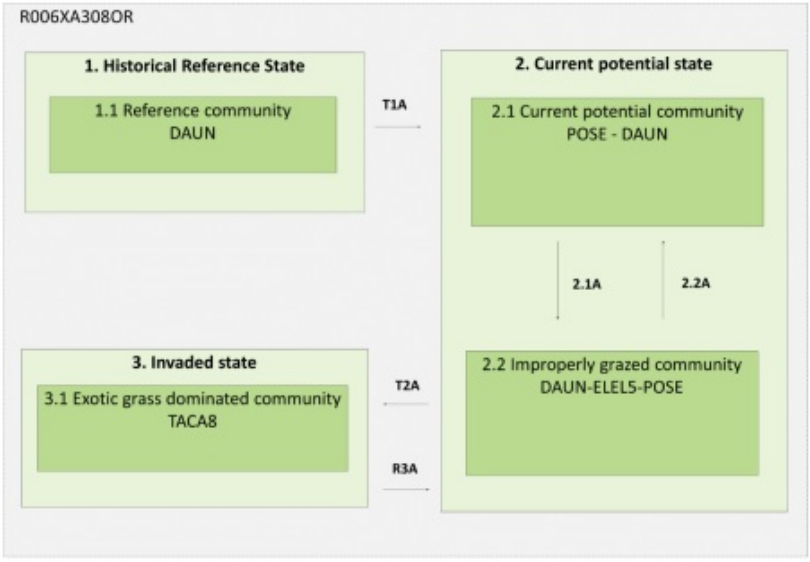
Disturbance:

This site is commonly grazed by livestock yet may be vulnerable to invasion by exotic species following overuse. Prolonged overuse causes a decline in oatgrass and increases in squirreltail and Sandberg bluegrass. Increasers

and invaders include medusahead (*Taeniatherum caput-medusae*), soft chess (*Bromus hordeaceus*), Pacific fescue (*Vulpia microstachys*), willowweed (Epilobium spp.), knotweed (Polyoganum spp.), tarweed (Madia spp.), collomia (collomia spp.) and collinsia (Collinsia spp.).

The state and transition model below represents a generalized and simplified version of community change in response to major disturbance types in this ecological site. It does not attempt to model all of the complex interacting effects of grazing, fire and invasive species on ecosystem change and the potential states and transitions emerging from these dynamics. Hotter and dryer conditions due to climate change will likely interact with existing disturbance process to create unpredictable ecosystem dynamics. Conversion of this site to cropland or pastureland is not likely, due to shallow soils.

State and transition model



Community Pathways

2.1A	Improper grazing management
2.2A	Extended rest from grazing

Transitions / Restoration Pathways

T1A	Introduction of invasive annual grasses
T2A	Prolonged improper grazing management, catastrophic fire
R3A	Extensive restoration activities designed to reduce invasive species

State 1
Historical Reference State

This grassland site is dominated by one-spike oatgrass in the Historical Reference Community. Sandberg bluegrass, bottlebrush squirreltail and various forbs are common. No invasive annual grasses are present in this state.

Dominant plant species

- Sandberg bluegrass (*Poa secunda*), grass
- onespike danthonia (*Danthonia unispicata*), grass

Community 1.1
Reference Plant Community

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	476	667	762
Forb	62	84	101
Shrub/Vine	22	34	34
Tree	–	–	–
Total	**560**	**785**	**897**

State 2
Current potential state

This state resembles the Reference State with the addition of some exotic species. The level of invasion is low enough for the site to maintain the primary ecological process and functions of the Reference State.

Dominant plant species

- Sandberg bluegrass (*Poa secunda*), grass
- onespike danthonia (*Danthonia unispicata*), grass

Community 2.1
Current potential community POSE - DAUN

Shallow, moderately fine textured soils makes this site prone to invasions of several weedy species, including exotic annual grasses, in a degraded state. This plant community is similar to Reference Community 1.1, with the addition of weedy annual forbs and exotic annual grasses.

Community 2.2
Improperly grazed community DAUN - ELEL5 - POSE

Improperly managed grazing for an extended period will lead to an increase in bottlebrush squirreltail, Sandberg bluegrass, medusahead and multiple exotic forbs (Archer 2001). Perennial grasses and seed sources still present on site.

Pathway 2.1A
Community 2.1 to 2.2

Improper grazing management and overutilization beyond acceptable limits of the site’s carrying capacity.

Pathway 2.2A
Community 2.2 to 2.1

Extended rest from grazing allowing native grasses to increase in cover, possible reseeding of native grasses and additional treatments

Context dependence. Excessive grazing leading to a loss of plant species diversity or reproductive output; or altered abiotic conditions, such as significantly compacted or eroded soil for example, will not recover by rest alone and will require additional inputs

State 3
Invaded state

Much of the perennial grasses have been lost and replaced by medusahead, soft chess, pacific fescue, willowweed, knotweed, tarweed, collomia and collinsia. This may result in an increase in fire frequency and size thereby maintaining the site in this state (Archer 2001).

Dominant plant species

- medusahead (*Taeniatherum caput-medusae*), grass

Transition T1A
State 1 to 2

An introduction of invasive annual grasses due to factors such as improperly managed grazing, recreational use, or transport via mechanical means will alter the resilience and resistance of the site to disturbance (Archer 2001).

Transition T1B
State 1 to 3

Prolonged improper grazing management leading to a loss of most perennial grasses and a widespread invasion of medusahead among other exotic species. This may also occur following catastrophic fire if exotic annuals were high in cover before disturbance (Archer 2001).

Restoration pathway R3A
State 3 to 1

Reduction of invasive species may be possible, but will be time and labor intensive and require significant inputs. Techniques may include prescribed burning, mechanical treatment, herbicide application and reseeding (Archer 2001). Inter-mound topography may restrict some activities.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Grass and grasslike plants**			572–880	
	onespike danthonia	DAUN	*Danthonia unispicata*	471–549	–
	Sandberg bluegrass	POSE	*Poa secunda*	39–157	–
	squirreltail	ELEL5	*Elymus elymoides*	39–78	–
	Idaho fescue	FEID	*Festuca idahoensis*	6–39	–
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	6–39	–
	silver hairgrass	AICA	*Aira caryophyllea*	6–17	–
Forb					
2	**Forbs**			56–112	
	lomatogonium	LOMAT2	*Lomatogonium*	22–39	–
	Gardner's yampah	PEGA3	*Perideridia gairdneri*	6–22	–
	western pearly everlasting	ANMA	*Anaphalis margaritacea*	6–17	–
	serrate balsamroot	BASE2	*Balsamorhiza serrata*	6–17	–
	largehead clover	TRMA3	*Trifolium macrocephalum*	6–17	–
3	**Other perennial forbs**			6–17	
	lupine	LUPIN	*Lupinus*	–	–
	onion	ALLIU	*Allium*	–	–
	yarrow	ACHIL	*Achillea*	–	–
Shrub/Vine					
4	**Shrubs**			17–56	
	buckwheat	ERIOG	*Eriogonum*	6–39	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	6–17	–
Tree					
5	**Trees**			–	

Inventory data references

Information presented here has been derived from NRCS data. Field observations from range trained personnel were also used. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

References

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. 2021 (Date accessed). USNVC [United States National Vegetation Classification]. 2019. United States National Vegetation Classification Database, V2.03. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC.. USNVC: http://usnvc.org/.

Other references

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Washburn, A.L., 1988. Mima mounds, an evaluation of proposed origins with special reference to the Puget Lowlands. Report of Investigations, State of Washington Department of Natural Resources, Division of Geology and Earth Resources Report no. 29, Olympia, Washington.

Contributors

Andrew Neary - 2020/2021 PES update of draft site

Approval

Kirt Walstad, 9/11/2023

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	05/19/2024
Approved by	Kirt Walstad
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:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**

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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:**
