Ecological site R006XB100OR
Wet Meadow

Last updated: 9/11/2023
Accessed: 10/12/2024

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, the Cascade Mountains, and spans the entirety of 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-Cretaceaus 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 broad group of sites encompasses meadow and riparian sites that occur across the MLRA. These sites range across MLRA 6 and span broad gradients of plant community composition, physiography, geology, and climate. These sites share common influences of adjacent riparian areas or wetlands and moist to wet soils with udic or aquic soil moisture regimes.

Classification relationships

Riparian Zone Associations of the Deschutes, Ochoco, Fremont, and Winema National Forests (Kovalchik 1987):
HQS2-21 – POTR/SYAL/ELGL

Riparian And Wetland Vegetation of Central and Eastern Oregon (Crowe et al. 2004):
CEGL000609 – POTR/SYAL
This site concept describes an herbaceous layer with a greater component of sedges and a shrub layer with a greater cover of willow compared to these associations.

Ecological site concept

This site represents a riparian meadow occurring within the foothills of the eastside of the Oregon Cascades. The

reference plant community is dominated by overstory aspen (Populus tremuloides), a shrub layer of willow (Salix spp.) and snowberry (Symphoricarpos spp.), and an herbaceous layer dominated by various sedge (Carex spp.) species. This site is like the common quaking aspen - snowberry community found throughout the Eastern Cascades, yet it experiences higher soil moisture and a higher water table allowing an increased component of species adapted to aquic conditions such as willow (Salix spp.) and sedge (Carex spp.) species. As such, this site likely experiences similar successional dynamics to aspen stands under these associated conditions. In comparison to other wet meadow sites described in the area, this site is drier and warmer and is not found occupying areas with coarse pumice soils. The soil moisture regime is xeric to aquic and the soil temperature regime is frigid.

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.

Associated sites

F006XY708OR	**Frigid Xeric Foothills 12-20 PZ** occupying adjacent forested map units where no water table is present

Similar sites

R006XB102OR	**Cold Wet Meadow** Elevation above 3,500 feet, cryic soil temperature regime, willow dominated

Table 1. Dominant plant species

Tree	(1) *Populus tremuloides*
Shrub	(1) *Symphoricarpos* (2) *Salix*
Herbaceous	(1) *Carex*

Physiographic features

This site occurs on nearly level floodplains found in small basins and river drainages. Slopes range from nearly level to 3 percent. Elevations range from 2,800 to 3,500 feet (850 to 1,050 meters). The soil surface may be briefly flooded from March to May, but the water table lowers to more than 4 feet below the surface in August and September. Ponding does not occur on this site.

Table 2. Representative physiographic features

Landforms	(1) Drainageway (2) Flood plain (3) Terrace
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	2,800–3,500 ft
Slope	0–3%
Ponding depth	0 in
Water table depth	48–80 in
Aspect	Aspect is not a significant factor

Climatic features

The annual precipitation ranges from 16 to 20 inches (400 to 500 mm), most of which occurs in the form of snow during the months of November through May. Spring rains are common. This site receives runoff from snow melt

during the spring and early summer. The soil temperature regime is frigid with a mean annual air temperature of about 44 degrees Fahrenheit (6.5°C). Temperature extremes range from 100 to -30 degrees Fahrenheit (38 to -34°C). The frost-free period ranges from 20 to 50 days. The optimum period for plant growth is from April through July. The soil moisture regime ranges from aquic to xeric. The graphs below are populated from the closest available weather station to representative site locations and are provided to indicate general climate patterns.

Table 3. Representative climatic features

Frost-free period (characteristic range)	20-50 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	16-20 in
Frost-free period (average)	35 days
Freeze-free period (average)	
Precipitation total (average)	18 in

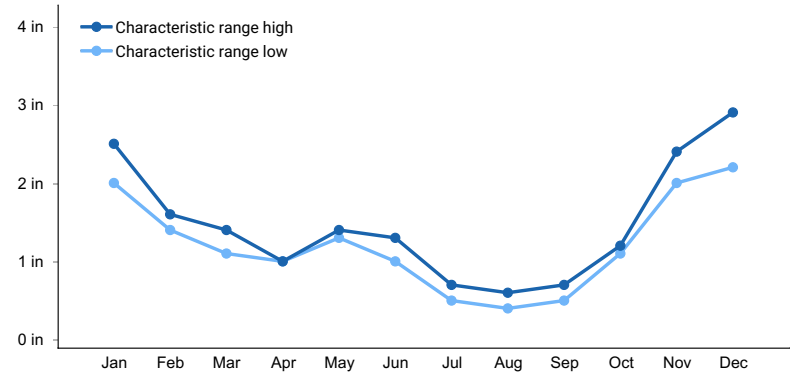


Figure 1. Monthly precipitation range

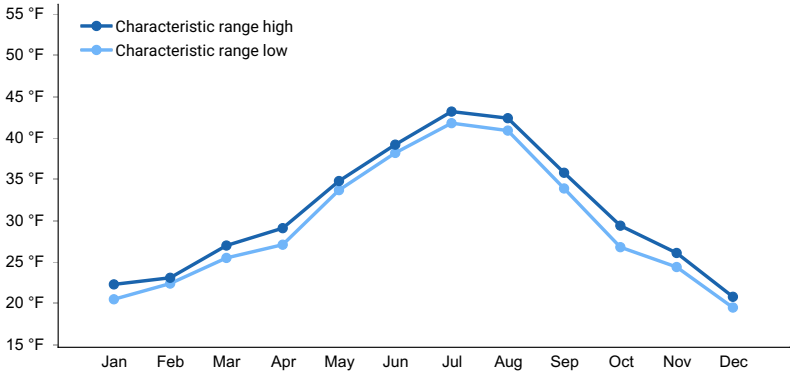


Figure 2. Monthly minimum temperature range

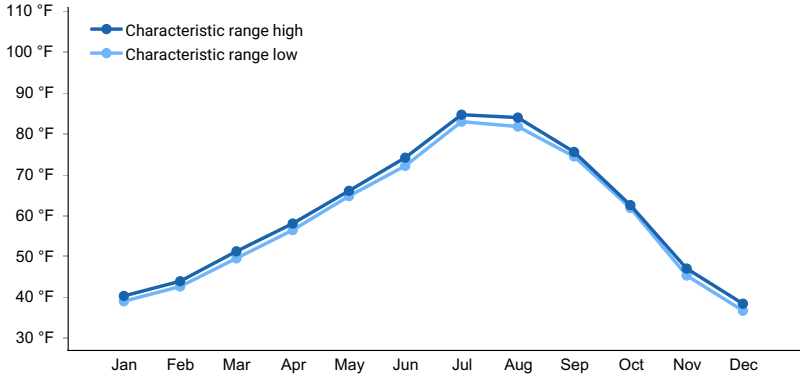


Figure 3. Monthly maximum temperature range

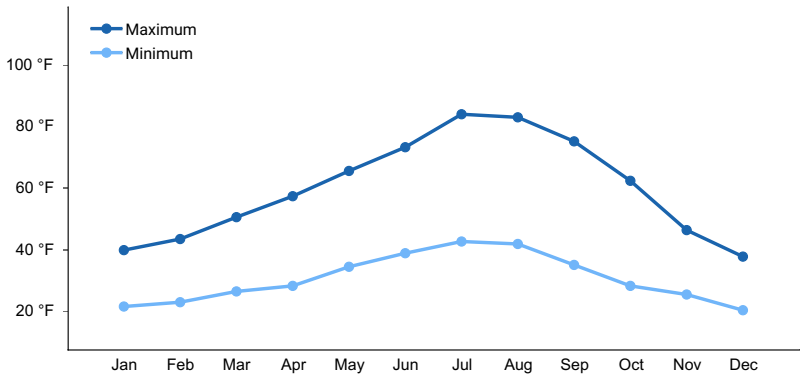


Figure 4. Monthly average minimum and maximum temperature

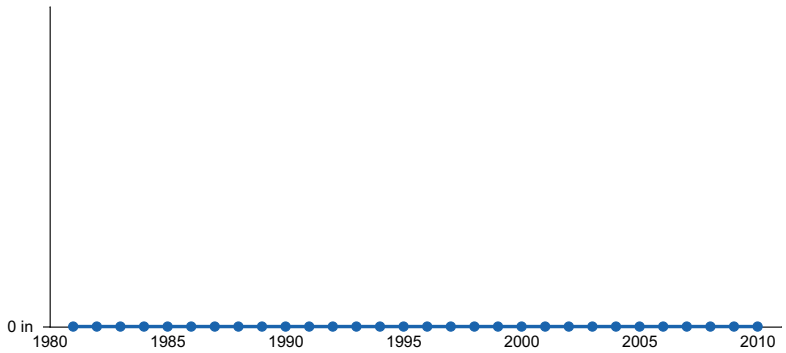


Figure 5. Annual precipitation pattern

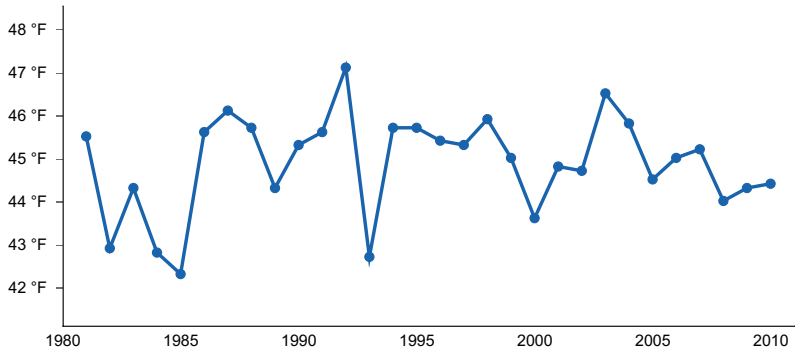


Figure 6. Annual average temperature pattern

Climate stations used

- (1) SISTERS [USC00357857], Sisters, OR
- (2) SUNRIVER [USC00358246], Bend, OR

Influencing water features

This site is adjacent to perennial streams or river channels. Flow alterations for irrigation and removal of beaver from the system may have altered the hydrology of this site.

Wetland description

Wetland delineation and description is pending further data collection.

Soil features

The soils of this site are typically deep to very deep and somewhat poorly drained. Typically the surface texture is a fine sandy loam or loamy fine sand about 20 inches thick, that is high in organic matter. The subsoil is typically a silt loam or a very fine sandy loam from a depth of about 20 to 48 inches. Depth to bedrock or an indurated pan is

usually greater than 60 inches. Permeability is moderately rapid and very rapid. The potential for erosion is slight to moderate except along streambanks during the snowmelt or high runoff periods.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Fine sandy loam (2) Loamy fine sand
Family particle size	(1) Coarse-loamy (2) Ashy
Drainage class	Somewhat poorly drained
Permeability class	Moderately rapid to very rapid
Depth to restrictive layer	60–80 in
Soil depth	60–80 in
Surface fragment cover <=3"	0–45%
Surface fragment cover >3"	0–45%
Available water capacity (0-40in)	4.6–5.9 in
Soil reaction (1:1 water) (0-40in)	6.6–7.8
Subsurface fragment volume <=3" (4-60in)	10–35%
Subsurface fragment volume >3" (4-60in)	5–15%

Ecological dynamics

Reference Plant community:

The Reference Native Plant Community is dominated by quaking aspen, willow, snowberry and sedges. Understory vegetative composition of the community is approximately 50 percent grasses and grass-like plants, 20 percent forbs and 30 percent shrubs and trees. Production and species composition is dependent on frequency and duration of flooding as well as depth to water table. Sedges are the dominant grass-like component of the understory with aspen and snowberry in the overstory. Tufted hairgrass (*Deschampsia cespitosa*) and oatgrass (Danthonia spp.) increase where the water table has been lowered.

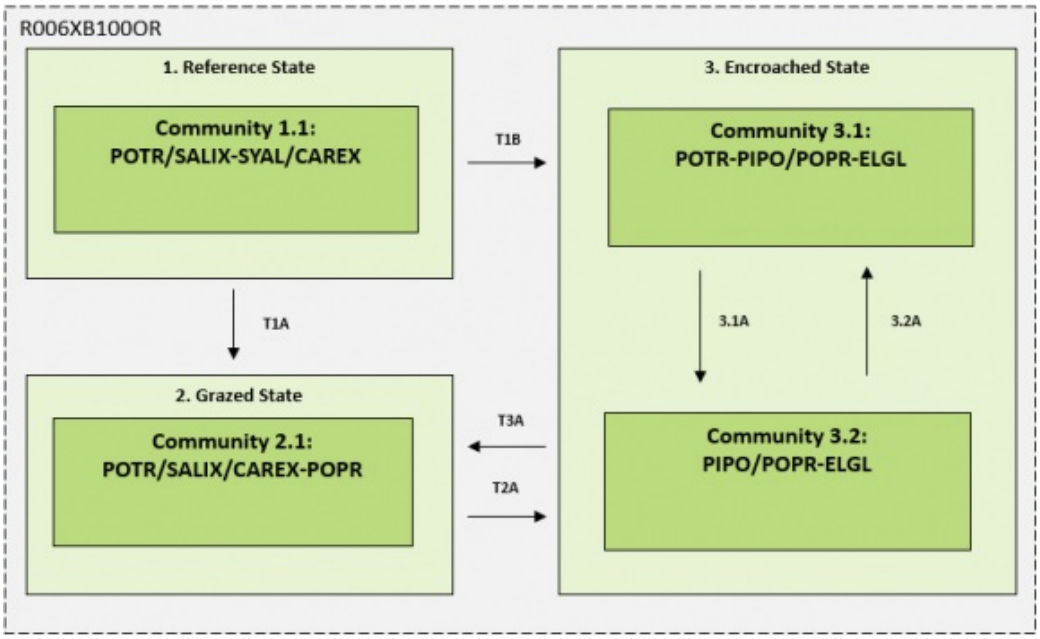
Disturbance:

If the condition of the site deteriorates, snowberry and aspen suckers decrease while Kentucky bluegrass (*Poa pratensis*) increases and may become codominant with sedges. Aspen and snowberry are the preferred species during late summer and fall. Heavy browsing of aspen suckers that prevents recruitment into the overstory, will lead to missing age classes in the stand (Debyle and Winokur 1985). Snowberry is sensitive to trampling and will decrease with heavy ungulate presence, eventually occupying only protected sites or being eliminated completely. Soil compaction may result from grazing when soils are moist. Under deteriorated conditions this site may consist of an overstory of mature aspen and ponderosa pine (*Pinus ponderosa*) with blue wildrye (*Elymus glaucus*), Kentucky bluegrass and forbs in the understory. Partial cutting of aspen will also favor conifers. Increased conifer cover may reduce the presence of shade intolerant aspen over time, especially in the absence of fire (Crowe et al. 2004). If heavy herbivory is sustained, the aspen overstory will diminish as mature trees succumb to disease, conifer encroachment, climate effects, or insects; and suckering aspen are prevented from recruitment beyond browsing height (Shepperd et al. 2006).

This state and transition model below represents a generalized and simplified version of plant community change in response to major disturbance types in this ecological site. It is largely based on expert knowledge of range scientists who developed the site originally, successional dynamics described in the aforementioned plant

associations, and peer reviewed descriptions of aspen community change in response to herbivory and conifer encroachment. Given that this site is associated with surface water sources which are expected to be impacted by climate change, and aspen which have been shown to be sensitive to drought impacts, future climate conditions are likely to lead to altered ecological dynamics. As this site is updated in future iterations, descriptions will include more thorough treatments of disturbance and ecological change.

State and transition model



Community Pathways

3.1A	Lack of fire, improperly managed grazing continues
3.2A	Fire introduced, grazing decreased

Transitions / Restoration Pathways

T1A	Improperly managed grazing
T1B	Improperly managed grazing and lack of fire
T2A	Further improperly managed grazing, lack of fire
T3A	High severity fire

State 1
Historical Reference State

This is the Reference Plant Community given an unaltered disturbance regime. It is highly likely that the Reference State, even in the best condition and highest potential, will almost always include at least some component of exotic species regardless of management inputs, this may also be referred to as the “current potential state”. In this document, the term “reference state” is used synonymously with “current potential state” for the sake of simplicity.

Dominant plant species

- quaking aspen (*Populus tremuloides*), tree
- willow (*Salix*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- sedge (*Carex*), grass

Community 1.1
Reference Community POTR/SALIX-SYAL/CAREX

This represents the Reference Plant Community for this site. It is dominated by quaking aspen of various age classes, willow, snowberry and sedges. Given the likelihood that this state, even in the best condition and highest potential, will almost always include at least some component of exotic species regardless of management inputs.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	240	385	575
Shrub/Vine	105	170	255
Forb	85	130	200
Tree	70	115	170
Total	**500**	**800**	**1200**

State 2
Heavy herbivory state

In this state, the site is being managed for livestock grazing. This may lead to altered plant community composition and production where plants adapted to grazing disturbance may increase while those sensitive to disturbance may decrease. Additionally, impacts to the abiotic conditions of the site may occur as soil is compacted due to hoof trampling or eroded due to an increase in bare ground.

Dominant plant species

- quaking aspen (*Populus tremuloides*), tree
- willow (*Salix*), shrub
- Kentucky bluegrass (*Poa pratensis*), grass
- sedge (*Carex*), grass

Community 2.1
POTR/SALIX/CAREX-POPR

As the condition of this site deteriorates as a result of improper grazing management, snowberry and aspen suckers decrease while Kentucky bluegrass increases and may become codominant with sedges.

State 3
Encroached state

In this state conifer encroachment has progressed to an extent that is fundamentally altering ecological processes. Competition for soil moisture, nutrients, and light, as well as a potential shift in fire dynamics will likely occur.

Dominant plant species

- ponderosa pine (*Pinus ponderosa*), tree
- Kentucky bluegrass (*Poa pratensis*), grass
- blue wildrye (*Elymus glaucus*), grass

Community 3.1
POTR-PIPO/PORP-ELGL

As improperly managed grazing is sustained and fire is suppressed, this site may transition to an overstory of mature aspen and ponderosa pine with blue wildrye, Kentucky bluegrass and forbs in the understory. Increased conifer cover may reduce the presence of shade intolerant aspen over time, especially in the absence of fire (Crowe et al. 2004).

Community 3.2
PIPO/POPR-ELGL

If heavy herbivory is sustained and fire continues to be suppressed, the aspen overstory will diminish as mature trees succumb to disease, conifer encroachment, climate effects, or insects; and suckering aspen are prevented from recruitment beyond browsing height (Shepperd et al. 2006).

Pathway 3.1A
Community 3.1 to 3.2

Lack of fire, overgrazing continues

Pathway 3.2A
Community 3.2 to 3.1

Fire introduced, grazing decreased

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

Transition T1A
State 1 to 2

Improperly managed grazing

Transition T1B
State 1 to 3

Improperly managed grazing and lack of fire leading to encroachment of conifer species

Transition T2A
State 2 to 3

Further improperly managed grazing, lack of fire leading to encroachment of conifer species

Transition T3A
State 3 to 2

High severity fire

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Grass and Grasslike plants**			185–385	
	smallwing sedge	CAMI7	*Carex microptera*	80–160	–
	Nebraska sedge	CANE2	*Carex nebrascensis*	40–80	–
	blue wildrye	ELGL	*Elymus glaucus*	40–80	–
	Geyer's sedge	CAGE2	*Carex geyeri*	24–64	–
2	**Other perennial grasses**			15–40	
	tufted hairgrass	DECE	*Deschampsia cespitosa*	0	–
	California oatgrass	DACA3	*Danthonia californica*	0	–
	Oregon bentgrass	AGOR	*Agrostis oregonensis*	0	–
Forb					
3	**Forbs**			55–105	
	bedstraw	GALIU	*Galium*	15–25	–
	columbine	AQUIL	*Aquilegia*	10–15	–
	sweetroot	OSMOR	*Osmorhiza*	10–15	–
	starry false lily of the valley	MAST4	*Maianthemum stellatum*	10–15	–
	meadow-rue	THALI2	*Thalictrum*	10–15	–
	canyon sunflower	VECA	*Venegasia carpesioides*	10–15	–
4	**Other perennial forbs**			15–40	
Shrub/Vine					
5	**Shrubs**			80–200	
	willow	SALIX	*Salix*	40–120	–
	coralberry	SYOR	*Symphoricarpos orbiculatus*	40–80	–
Tree					
6	**Trees**			40–120	
	quaking aspen	POTR5	*Populus tremuloides*	40–120	–
7	**Other Trees**			10–15	
	white fir	ABCO	*Abies concolor*	0	–
	ponderosa pine	PIPO	*Pinus ponderosa*	0	–

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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Other references

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Contributors

Andrew Neary - 2020/2021 PES update of draft site

Approval

Kirt Walstad, 9/11/2023

Acknowledgments

Development of this site as a range site was based on field data collection completed in 1989. It was revised and updated with information regarding ecological dynamics in 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	10/12/2024
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:**

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:

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17. **Perennial plant reproductive capability:**