USDA Natural Resources
Conservation Service

Ecological site R003XY012OR
Ashy Alpine Meadow 50-70 PZ

Last updated: 1/29/2025
Accessed: 05/21/2025

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.

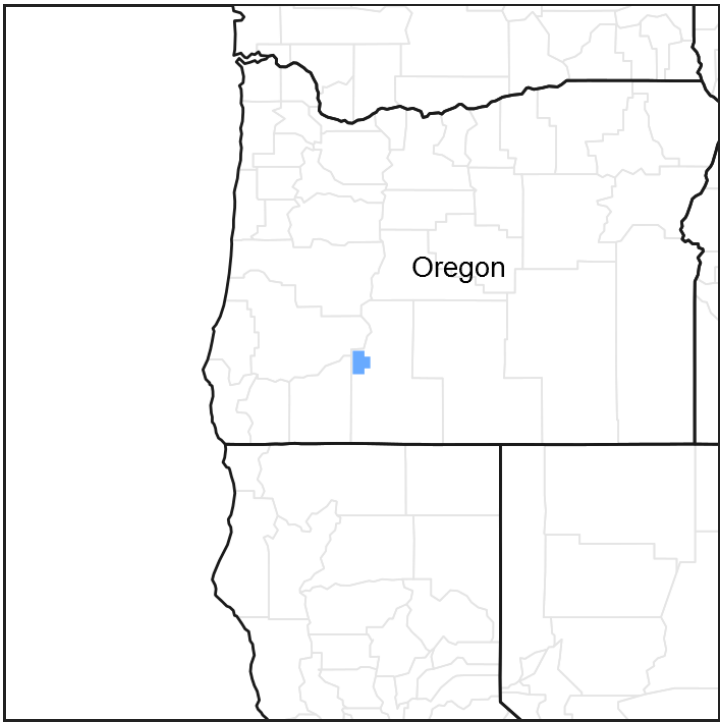


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Associated sites

R003XY011OR	**Ashy Alpine Desert 50-70 PZ** Occurs on inclusions and complexes within this site.
R003XY013OR	**Ashy Alpine Swale 50-70 PZ** Occurs on inclusions and complexes within this site.

Similar sites

R003XY013OR	**Ashy Alpine Swale 50-70 PZ**
R003XY011OR	**Ashy Alpine Desert 50-70 PZ**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The site occurs around the rim (but especially on the south, southwest, and southeast) and extends to areas around Union Peak and Crater Peak to the south. This site is associated with the Ashy Alpine Desert and Swale sites and is arrayed in a park-like setting surrounded by and interspersed with stringers of Mountain hemlock, Shasta Red Fir, and/or Lodgepole Pine.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Ash flow (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,676–2,286 m
Slope	0–30%
Ponding depth	0 cm
Water table depth	152 cm
Aspect	S, SW, W

Climatic features

Precipitation comes mostly as snow. Winters are snowy and very cold; summers are cool and dry. Summer thunderstorms sometimes occur, providing small amounts of growing season precipitation.

The Ashy Alpine Meadow has a severe climatic regime characterized by wide day and nighttime temperatures.

Table 3. Representative climatic features

Frost-free period (average)	45 days
Freeze-free period (average)	90 days
Precipitation total (average)	1,524 mm

Influencing water features

Accumulates snowment early in the year. Some poorly defined channels are modified by background wind ersoion later in the season. The snowpack can linger in some concave protected areas, delaying the advent of the growing season and adding soil water later in the season.

Soil features

These sites occur in alpine and sub-alpine meadows. The soils are very deep, excessively drained, very gravelly ashy loamy coarse sand over ashy sand and ashy coarse sand derived from ash, andesite, and pumice fragments.

Increases in stability of both surface and subsurface samples reflect increased soil erosion resistance and resilience. Surface stability is correlated with current erosion resistance, while subsurface stability is correlated with resistance following soil disturbance. Sites with average values of 5.5 or above generally are very resistant to erosion, particularly if there is little bare ground and there are few large gaps. Maximum possible soil stability values may be less than 6 for very coarse sandy soils. High values usually reflect good hydrologic function. This is because stable soils are less likely to disperse and clog soil pores during rainstorms. High stability values also are strongly correlated with soil biotic integrity. Soil organisms make the “glue” that holds soil particles together. In most ecosystems, soil stability values decline first in areas without cover (Veg = NC). In more highly degraded systems, Veg = Canopy values also decline.

The following soil aggregate stability results are typical of the reference plant community. Vegetation is critical for protecting soils on this ecological site. Grass/grasslikes and shrubs offer the most protection. Unprotected soils are prone to wind and water erosion.

Type location Average Stability:
All samples taken = 3.4
Protected samples = 4.2
Unprotected samples = 2.4

Type location Average Stability by Vegetation Class:
No cover = 2.6
Grass/Grasslikes = 4.3
Forbs = 3.0
Shtubs = 4.5
Trees = N/A

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Ashy loamy sand
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	152 cm
Surface fragment cover <=3"	3–10%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	14.73–16.51 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	10–20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Subsurface fragment volume <=3" (Depth not specified)	0–1%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

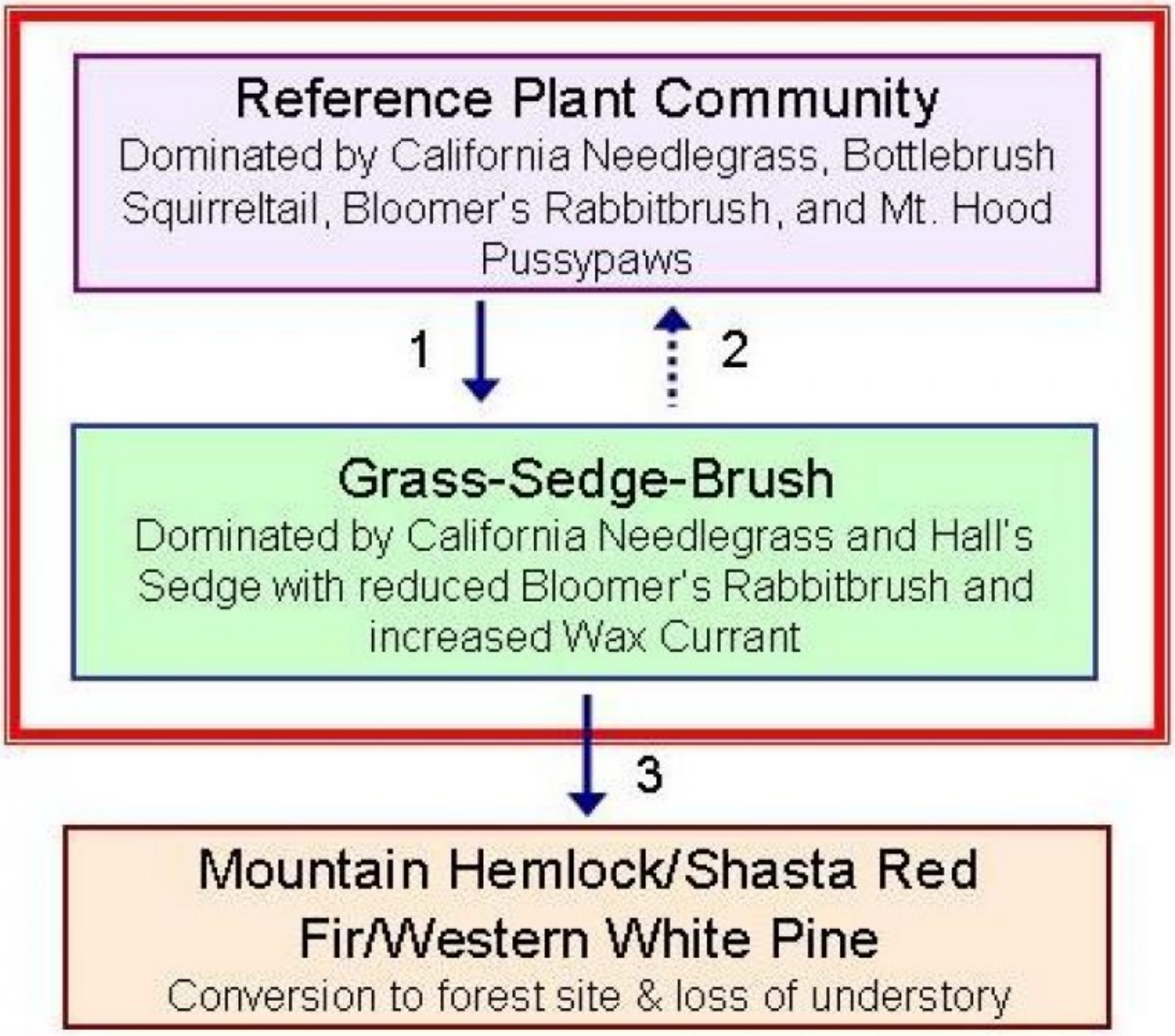
The Ashy Alpine Meadow ecological site is significant in its range of occurance, size of openings in the forest ecosystem, species diversity, and relative productive capability. Reference areas for this site indicate fluctuation in relative amounts of graminoids and shrubs. Bloomer's Goldenweed dominates some sites and is sparse in others. Grazing pressure from native ungulates and other species, depth and duration of snowpack, encroachment pressure from adjacent forest sites, and growing season temperature and moisture conditions have probable effects on the differences in plant community comnposition.

These park-like areas are surrounded by Mountain Hemlock (*Tsuga mertensiana*) and Whitebark Pine (*Pinus albicaulis*) forest sites at higher altitudes (> 6500 feet) and Mountain Hemlock (*Tsuga mertensiana*), Shasta Red Fir (Abies x shastensis), and Western White Pine (*Pinus monticola*) at lower elevations (5500 - 6500 feet). These sites are strongly correlated to soil types and are thought to be relatively permanent although plant community structure may have been different historically (Lynch, 1998).

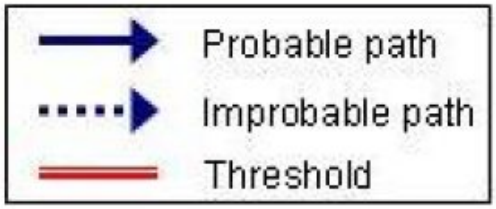
Historic fire frequencies probably mirrored those of the adjacent forest sites. A fire could be sustained on these sites only in a few high growth years. Adjacent forest sites would be moved back, increasing the size of the openings and encouraging more herbaceous growth.

Boundaries between forest and rangeland are generally abrupt and rarely are there rapid, significant intrusions of tree species into the sites (encroachment occurs over decades). There has historically been a large amount of time between catastrophic fires at these elevations (400-800 years for Mountain Hemlock and 70-130 years for Red Fir). Local Indian tribes, who used the area frequently in the summers, may have set fires to freshen vegetation to attract more big game to the area.

State and transition model



R003XY012OR: ASHY ALPINE MEADOW 50-70 PZ



1. Lack of fire, low spring moisture, encroachment of forest (increased sheltering)
2. Fire, low snow pack (winter drying), decreased sheltering of adjacent forest
3. Long-term lack of fire (climate change?)

State 1
Reference

Community 1.1
Herbaceous

The Ashy Alpine Meadow site is the most widespread of the alpine sites. This site is a relatively productive grassy meadow site dominated by Western Needlegrass (*Achnatherum occidentale* ssp. californicum) Hall's Sedge (*Carex halliana*), Bottlebrush Squirreltail (*Elymus elymoides* ssp. elymoides), and the shrubby Bloomer's Goldenweed (*Ericameria bloomeri*) which has brilliant yellow flowers in July and August. Fire is an important modifier of this plant community but frequencies are long (400-800 years) where the sites are surrounded by Mountain Hemlock/Whitebark Pine forest communities. Mature Mountain Hemlock stands that succumb to fire are replaced by Lodgepole Pines for up to 200 years. Where mature Mountain Hemlock has been replaced, encroachment of woody species into the site is a possibility (shrubs and trees). This site provides important summer forage for large ungulates and rodents (and hence raptors). Increases in the proportion of canopy gaps are related to increased risk of wind erosion and invasive “weed” species establishment. For example, wind velocities in most areas of the western United States are capable of moving disturbed soil in 20-in gaps in grasslands. Disturbed soil in gaps 3-6 ft in diameter is nearly as susceptible to erosion as that with no vegetation. Minimum gap size required to cause wind erosion increases with vegetation height. Increases in the proportion of the line covered by large basal gaps reflect increased susceptibility to water erosion and runoff. Plant bases slow water movement down slopes. As basal gaps increase, there are fewer obstacles to water flow, so runoff and erosion increase. Increases in large basal gaps have a greater effect where rock and litter cover are low, because they are the only obstacles to water flow and erosion. The following canopy and basal gaps are typical of the reference plant community. Moderate plant cover is reflected in the large amount of smaller canopy gaps. Plant density is low, however; basal gaps are mostly larger than 6 feet. Type Location Canopy Gaps (%): 1.0-2.0 ft. = 26.4 2.1-3.0 ft. = 10.1 3.1-6.0 ft. = 5.8 > 6.0 ft. = 4.2 Type Location Basal Gaps (%): 1.0-2.0 ft. = 2.2 2.1-3.0 ft. = 5.4 3.1-6.0 ft. = 8.9 > 6.0 ft. = 63.9

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	224	448	673
Forb	112	224	336
Shrub/Vine	56	112	168
Total	**392**	**784**	**1177**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	5-10%
Grass/grasslike foliar cover	5-10%
Forb foliar cover	10-20%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-40%
Surface fragments >0.25" and <=3"	10-20%
Surface fragments >3"	1-5%
Bedrock	0%
Water	0%
Bare ground	50-60%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	1-2%	1-2%	1-6%
>0.15 <= 0.3	–	1-2%	1-2%	1-6%
>0.3 <= 0.6	–	0-1%	1-2%	–
>0.6 <= 1.4	–	–	0-1%	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 5. Plant community growth curve (percent production by month). OR1253, A3 Ashy Alpine Meadow. 012 for both reference plant communities.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	5	25	40	25	5	0	0	0

Community 1.2
Herbaceous and Shrubby

This plant community occurs in either of three situations: 1) smaller openings in the forest sites that provide increased sheltering and modify the impact of snow pack melt-off in the

early summer, and 2) lower elevations ranging from 5500 to 6500 feet surrounded by Shasta Red Fir/Western White Pine forests, and 3) sites adjacent to Lodgepole Pine forest (fire-induced stand replacement of Mountain Hemlock). Fire frequencies reflect the adjacent forest sites (70-130 years for Shasta Red Fir and < 20 years for Lodgepole Pine). The site is characterized by increased production of California Needlegrass, Hall's Sedge (most dominant) and Long-stolon sedge. There is a decrease in the amount of Brewer's Rabbitbrush and the addition of Wax Currant. Restoring natural fire frequencies will remove woody competition, increase the size of the openings, and return the plant community to a more herbaceous aspect. With removal of natural fire from the ecosystem, this site is prone to conversion to forest (Mountain Hemlock, Shasta Red Fir, and Western White Pine) with a consequent loss of the grass/grasslike and shrub functional groups. Canopy and basal gaps are similar to reference plant community #1.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	841	1121	1401
Forb	168	224	280
Shrub/Vine	112	168	224
Total	**1121**	**1513**	**1905**

Table 9. Ground cover

Tree foliar cover	1-2%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	7-15%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	1-2%
Litter	20-40%
Surface fragments >0.25" and <=3"	10-20%
Surface fragments >3"	1-5%
Bedrock	0-2%
Water	0%
Bare ground	45-55%

Table 10. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	1-3%	3-6%	3-6%
>0.15 <= 0.3	–	2-4%	3-5%	5-10%
>0.3 <= 0.6	–	1-3%	1-2%	3-6%
>0.6 <= 1.4	–	1-2%	1-2%	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Pathway 1.1A
Community 1.1 to 1.2

Lack of fire, low spring moisture, encroachment of forest

Pathway 1.2A
Community 1.2 to 1.1

Fire , low snow pack, decreased sheltering of adjacent forest

Additional community tables

Table 11. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant deep-rooted Perennial Grasses and Sedges**			224–673	
	California needlegrass	ACOCC	*Achnatherum occidentale ssp. californicum*	112–336	–
	Hall's sedge	CAHA2	*Carex halliana*	56–224	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	56–168	–
Forb					
2	**Perennial Forbs**			112–336	
	Pacific lupine	LULE2	*Lupinus lepidus*	28–84	–
	spreading phlox	PHDI3	*Phlox diffusa*	28–84	–
	Davis' knotweed	PODA	*Polygonum davisiae*	28–84	–
	sagebrush violet	VIVA	*Viola vallicola*	28–84	–
	Mt. Hood pussypaws	CIUM	*Cistanthe umbellata*	28–84	–
	marumleaf buckwheat	ERMA4	*Eriogonum marifolium*	28–84	–
	Shasta buckwheat	ERPY2	*Eriogonum pyrolifolium*	6–17	–
	cobwebby Indian paintbrush	CAAR11	*Castilleja arachnoidea*	6–17	–
Shrub/Vine					
3	**Shrubs**			56–168	
	rabbitbush	ERBL2	*Ericameria bloomeri*	56–168	–

Animal community

Wildlife extensively use range and forest areas for food and cover. The survey area has excellent forage resources for summer and fall grazing. The alpine meadows surrounding the rim and Union peak are dominated by Western Needlegrass (*Achnatherum occidentale* ssp. californicum) with Hall's Sedge (*Carex halliana*) and Brewer's Sedge (Carex Breweri) subdominant. In some places Bottlebrush Squirreltail (*Elymus elymoides* ssp. elymoides) is present also. These species all have nutritive value for grazing ungulates from green-up in June and July through September and early October. Deep snow cover and very cold temperatures in the winter and spring make grazing these sites impractical. These alpine meadows and swells have excellent interspersion of forested sites providing hiding and thermal cover as well as transportation corridors for wildlife.

Recreational uses

Significant aesthetic beauty. Park-like setting is desirable for camping, hiking, and other outdoor pursuits.

Wood products

None

Type locality

Location 1: Klamath County, OR	
Township/Range/Section	T31S R6E S13
UTM zone	N
UTM northing	576287
UTM easting	4748598
General legal description	Center of section 13 between rim road and Greyback road, about 1/2 mile below rim road. Headwaters of Watson creek.

Other references

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Contributors

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Approval

Kirt Walstad, 1/29/2025

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	01/29/2025
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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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:**
