USDA Natural Resources Conservation Service

Ecological site F025XY086NV
Deep Subalpine Slope

Last updated: 4/24/2024
Accessed: 05/05/2024

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): 025X–Owyhee High Plateau

MLRA Notes 25—Owyhee High Plateau
This area is in Nevada (56 percent), Idaho (30 percent), Oregon (12 percent), and Utah (2 percent). It makes up about 27,443 square miles. MLRA 25 is characteristically cooler and wetter than the neighboring MLRAs of the Great Basin. The western boundary is marked by a gradual transition to the lower and warmer basins of MLRA 24. The boundary to the south-southeast, with MLRA 28B, is marked by gradual changes in geology marked by an increased dominance of singleleaf pinyon and Utah juniper and a reduced presence of Idaho fescue. The boundary to the north, with MLRA 11, is a rapid transition from the lava plateau topography to the lower elevation Snake River Plain.
Physiography:
All of this area lies within the Intermontane Plateaus. The southern half is in the Great Basin section of the Basin and Range province. This part of the MLRA is characterized by isolated, uplifted fault-block mountain ranges separated by narrow, aggraded desert plains. This geologically older terrain has been dissected by numerous streams draining to the Humboldt River.
The northern half of the area lies within the Columbia Plateaus province. This part of the MLRA forms the southern boundary of the extensive Columbia Plateau basalt flows. Most of the northern half is in the Payette section, but the northeast corner is in the Snake River Plain section. Deep, narrow canyons draining into the Snake River have been incised into this broad basalt plain. Elevation ranges from 3,000 to 7,550 feet on rolling plateaus and in gently sloping basins. It is more than 9,840 feet on some steep mountains. The Humboldt River crosses the southern half of this area
Geology:
The dominant rock types in this MLRA are volcanic. They include andesite, basalt, tuff, and rhyolite. In the north and west parts of the area, Cretaceous granitic rocks are exposed among Miocene volcanic rocks in mountains. A Mesozoic igneous and metamorphic rock complex dominates the south and east parts of the area. Upper and Lower Paleozoic calcareous sediments, including oceanic deposits, are exposed with limited extent in the mountains. Alluvial fan and basin fill sediments occur in the valleys.
Climate:
The average annual precipitation in most of this area is typically 11 to 22 inches. It increases to as much as 49 inches at the higher elevations. Rainfall occurs in spring and sporadically in summer. Precipitation occurs mainly as snow in winter. The precipitation is distributed fairly evenly throughout fall, winter, and spring. The amount of precipitation is lowest from midsummer to early autumn. The average annual temperature is 33 to 51 degrees F. The freeze-free period averages 130 days and ranges from 65 to 190 days, decreasing in length with elevation. It is typically less than 70 days in the mountains.
Water:
The supply of water from precipitation and streamflow is small and unreliable, except along the Owyhee, Bruneau, and Humboldt Rivers. Streamflow depends largely on accumulated snow in the mountains. Surface water from mountain runoff is generally of excellent quality and suitable for all uses. The basin fill sediments in the narrow alluvial valleys between the mountain ranges provide some ground water for irrigation. The alluvial deposits along the large streams have the most ground water. Based on measurements of water quality in similar deposits in

adjacent areas, the basin fill deposits probably contain moderately hard water. The water is suitable for almost all uses. The carbonate rocks in this area are considered aquifers, but they are little used. Springs are common along the edges of the limestone outcrops.

Soils:

The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic or frigid temperature regime and an aridic, aridic bordering on xeric, or xeric moisture regime. Soils with aquic moisture regimes are limited to drainage or spring areas, where moisture originates or runs on and through. These soils are of a very limited extent throughout the MLRA. They generally are well drained, clayey or loamy, and shallow or moderately deep. Most of the soils formed in mixed parent material. Volcanic ash and loess mantle the landscape. Surface soil textures are loam and silt loam with ashy texture modifiers in some areas. Argillic horizons occur on the more stable landforms. They are exposed nearer the soil surface on convex landforms, where ash and loess deposits are more likely to erode. Soils that formed in carbonatic parent material in areas that receive less than 12 inches of precipitation are characterized by calcic horizons throughout the profile, while soils in areas that receive more than 12 inches of precipitation do not have calcic horizons in the upper part of the profile. Soils that formed on stable landforms at the lower elevations are dominated by ochric horizons. Soils that formed at the middle and upper elevations are characterized by mollic epipedons. Soils in drainage areas at all elevations that receive moisture running on or through them are characterized by thicker mollic epipedons.

Biological Resources:

This MLRA supports shrub-grass vegetation. Lower elevations are characterized by Wyoming big sagebrush associated with bluebunch wheatgrass, western wheatgrass, and Thurber’s needlegrass. Other important plants include bluegrass, squirreltail, penstemon, phlox, milkvetch, lupine, Indian paintbrush, aster, and rabbitbrush. Black sagebrush occurs but is less extensive. Singleleaf pinyon and Utah juniper occur in limited areas. With increasing elevation and precipitation, vast areas characterized by mountain big sagebrush or low sagebrush/early sagebrush in association with Idaho fescue, bluebunch wheatgrass, needlegrasses, and bluegrass become common. Snowberry, curl-leaf mountain mahogany, ceanothus, and juniper also occur. Mountains at the highest elevations support whitebark pine, Douglas-fir, limber pine, Engelmann spruce, subalpine fir, aspen, and curl-leaf mountain mahogany.

Major wildlife species include mule deer, bighorn sheep, pronghorn, mountain lion, coyote, bobcat, badger, river otter, mink, weasel, golden eagle, red-tailed hawk, ferruginous hawk, Swainson’s hawk, northern harrier, prairie falcon, kestrel, great horned owl, short-eared owl, long-eared owl, burrowing owl, pheasant, sage grouse, chukar, gray partridge, and California quail. Reptiles and amphibians include western racer, gopher snake, western rattlesnake, side-blotched lizard, western toad, and spotted frog. Fish species include bull, red band, and rainbow trout.

Ecological site concept

This ecological site is in the zone of mid-elevation to the subalpine mountains. The site is dominated by whitebark pine. Soils of this site are deep, well drained and formed in loess over glacial moraine deposits derived from metamorphic rock. Soils are characterized by an ochric epipedon. Soil moisture regime is xeric and soil temperature regime is cryic.

The plant community is characterized by 50 to 70 percent overstory canopy cover of whitebark pine. Understory is sparse and litter cover is typically greater than 90 percent. Common understory includes bluegrass species and gooseberry.

Associated sites

R025XY077NV	**Dry Snowfield** Dry Snowfield has an umbric epipedon.
R025XY024NV	**MOUNTAIN RIDGE** Mountain Ridge is shallow to bedrock.

Similar sites

R025XY077NV	**Dry Snowfield** Dry Snowfield has an umbric epipedon.

Table 1. Dominant plant species

Tree	(1) *Pinus albicaulis*
Shrub	(1) *Ribes* (2) *Vaccinium*
Herbaceous	(1) *Poa* (2) *Carex*

Physiographic features

This ecological site is on high elevation mountain side slopes. Elevations range from 9,000 to 11,000 feet. Slopes typically range from 30 to 75 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope
Runoff class	Very high
Flooding frequency	None
Ponding frequency	None
Elevation	9,000–11,000 ft
Slope	30–75%
Water table depth	60 in
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

In general, the climate associated with this ecological site is characteristics of the subalpine zone. Winters are long and cold whereas summers are short and dry. Mean annual temperatures range from 38 to 45 degrees F. Average annual growing season is typically less than 60 days.

Mean annual precipitation across the range of this ecological site is 16 inches.

Monthly mean precipitation: January 1.65”; February 1.68”; March 1.98”; April 2.43”; May 2.41”; June 1.62”; July 0.61”; August 0.63”; September 0.84”; October 1.41”; November 1.51”; December 1.79”.

*The above data is averaged from the Jarbridge 4N and Lamoille PH WRCC climate stations, the Western Regional Climate Center database and the NASIS database.

Table 3. Representative climatic features

Frost-free period (characteristic range)	50-90 days
Freeze-free period (characteristic range)	60-100 days
Precipitation total (characteristic range)	14-20 in
Frost-free period (actual range)	45-100 days
Freeze-free period (actual range)	60-100 days
Precipitation total (actual range)	13-29 in
Frost-free period (average)	70 days
Freeze-free period (average)	85 days
Precipitation total (average)	16 in

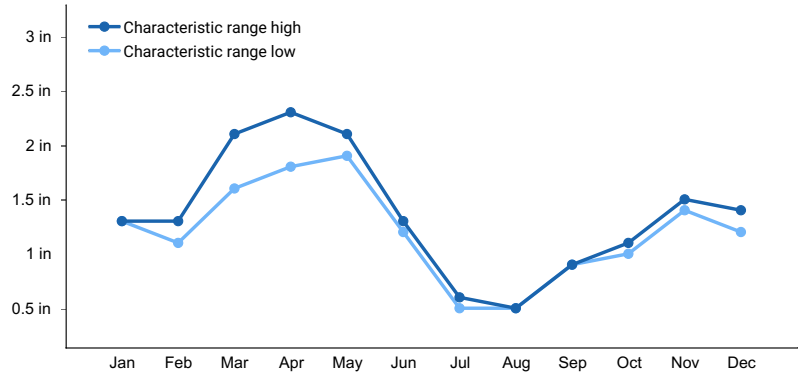


Figure 1. Monthly precipitation range

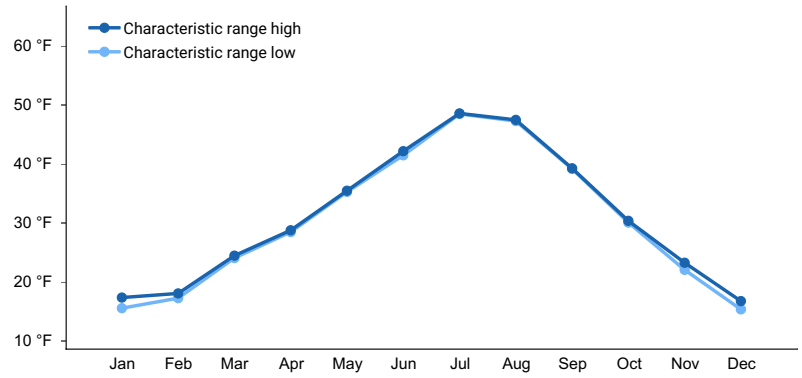


Figure 2. Monthly minimum temperature range

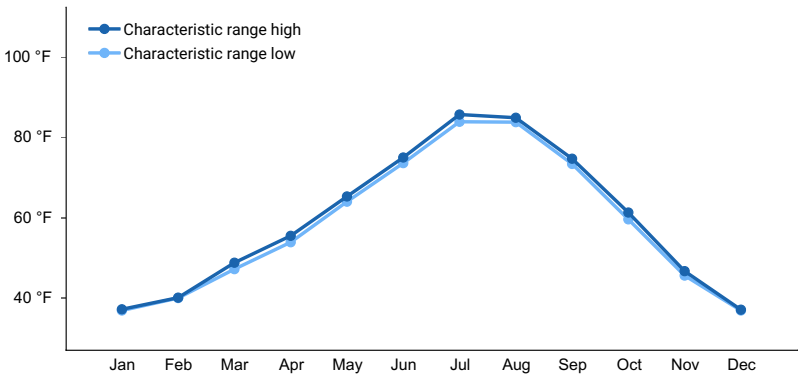


Figure 3. Monthly maximum temperature range

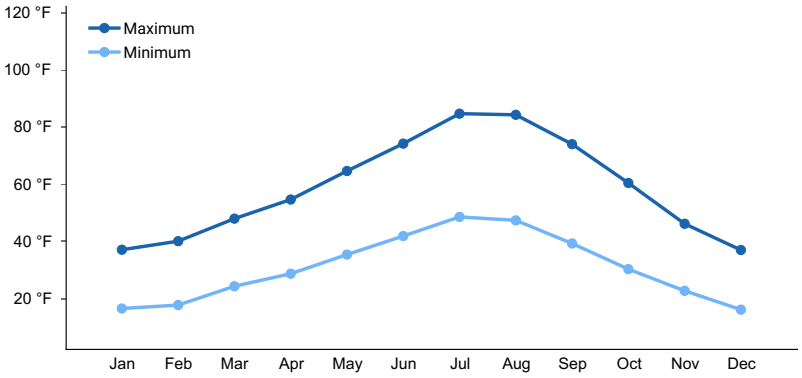


Figure 4. Monthly average minimum and maximum temperature

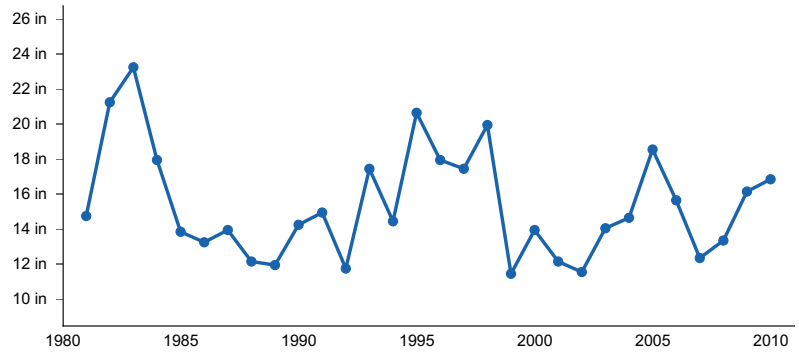


Figure 5. Annual precipitation pattern

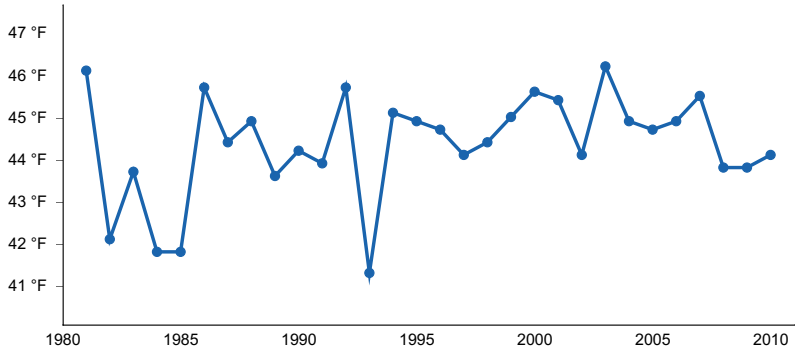


Figure 6. Annual average temperature pattern

Climate stations used

- (1) LAMOILLE YOST [USC00264394], Spring Creek, NV
- (2) JARBIDGE 7 N [USC00264039], Jackpot, NV

Influencing water features

Influencing water features are not associated with this site.

Soil features

Soils of this site are moderatley deep to deep, well drained, and formed in loess over glacial moraine deposits derived from metamorphic rock. Soils are characterized by an ochric epipedon from the mineral soil surface to 20cm and an organic horizon comprised of partially decomposed pine needles. The soil moisture regime is xeric and soil temperature regime is cryic.
The representative soil series associated with this site is Jackmore, a loamy-skeletal, mixed, superactive, nonacid, Typic Cryorthents. Jackmore is characterized by greater than 35 percent rock fragments and clay content of 2 to 10 percent in the particle size control section.
The soil series correlated to this site is: Jackmore.

Table 4. Representative soil features

Parent material	(1) Glaciomarine deposits–metavolcanics (2) Loess
Surface texture	(1) Very gravelly very fine sandy loam (2) Very gravelly
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	20–40 in

Soil depth	20–40 in
Surface fragment cover <=3"	0–35%
Surface fragment cover >3"	0–5%
Available water capacity (0-40in)	4–6 in
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.2–6.6
Subsurface fragment volume <=3" (Depth not specified)	35–60%
Subsurface fragment volume >3" (Depth not specified)	5%

Table 5. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Depth to restrictive layer	Not specified
Soil depth	20–60 in
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-40in)	Not specified
Electrical conductivity (0-40in)	Not specified
Sodium adsorption ratio (0-40in)	Not specified
Soil reaction (1:1 water) (0-40in)	Not specified
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Abiotic factors:The primary abitoic factors driving this site are extended disturbance return intervals, high elevations and cold temperatures.

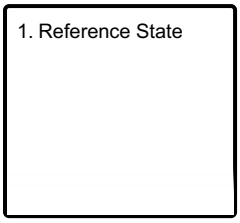
Ecological dynamics: Whitebark pine (*Pinus albicaulis*) communities generally consist of clusters of long-lived genetically similar individuals (Fryer 2002).
This ecological site is found in the subalpine and timberline zones of high elevation mountains in the northeastern Great Basin. The Ruby Mountains of Nevada is the only area where whitebark pine can be found growing in the subalpine zone with limber pine (*P. flexilis*) and Great Basin bristlecone pine (*P. longaeva*) (Fryer 2002).
Seed caching by Clark's nutcrackers is the only meaningful method of seed dispersal of whitebark pine. The cones are indehiscent and the nutcrackers must break through the cones with their beaks to remove seeds and bury them in shallow caches intended for use as future food (Fryer 2002).

Disturbance ecology: A number of factors reduce natural regeneration in whitebark pine. White pine blister rust, fire

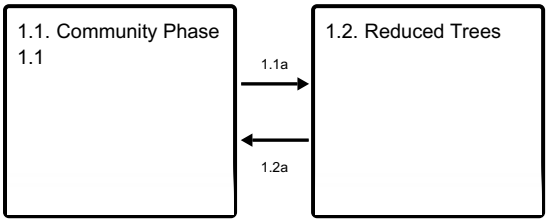
exclusion, bark beetles, animals and fungal disease all reduce the ability of mature trees to reproduce (Fryer 2002).

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference State

The reference state is representative of the natural range of variability prior to Euro-American settlement conditions. Community phases are stable and extremely long-lived. Natural disturbances under pristine conditions include periodic wildfire, extreme weather events, disease and insect attack.

Community 1.1
Community Phase 1.1

Community phase 1.1 is characterized by patches of extremely long-lived whitebark pine.

Forest overstory. Forest overstory is dominated by whitebark pine.

Forest understory. Forest understory is dominated by grasses and grasslikes. Dominant species include bluegrass (Poa spp.), Idaho festcue (Festuca idahoensis) and sedges (Carex spp.). Low growing, perennial forbs are found through out the site. Shrubs including gooseberry (Ribes spp.) and whortleberry (Vaccinium myrtillus) are present, but do not dominate.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	25	50	70
Forb	20	25	40
Grass/Grasslike	15	25	30
Total	**60**	**100**	**140**

Table 7. Ground cover

Tree foliar cover	40-65%
Shrub/vine/liana foliar cover	2-5%
Grass/grasslike foliar cover	2-5%
Forb foliar cover	1-3%
Non-vascular plants	1-5%
Biological crusts	0-1%

Litter	70-95%
Surface fragments >0.25" and <=3"	0-1%
Surface fragments >3"	0-1%
Bedrock	0-5%
Water	0%
Bare ground	0-1%

Community 1.2
Reduced Trees

Disturbance reduces tree cover.

Pathway 1.1a
Community 1.1 to 1.2

Natural disturbances under pristine conditions include periodic wildfire, extreme weather events, disease and insect attack.

Pathway 1.2a
Community 1.2 to 1.1

Time since disturbance.

Additional community tables

Table 8. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
whitebark pine	PIAL	*Pinus albicaulis*	Native	–	50–75	13–47	–

Table 9. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
bluegrass	POA	*Poa*	Native	–	3–8
needlegrass	ACHNA	*Achnatherum*	Native	–	1–5
sedge	CAREX	*Carex*	Native	–	0–3
Idaho fescue	FEID	*Festuca idahoensis*	Native	–	0–3
Forb/Herb					
Lewis flax	LILE3	*Linum lewisii*	Native	–	0–3
heartleaf arnica	ARCO9	*Arnica cordifolia*	Native	–	0–3
tuber starwort	PSJA2	*Pseudostellaria jamesiana*	Native	–	0–2
Shrub/Subshrub					
currant	RIBES	*Ribes*	Native	–	3–8
whortleberry	VAMY2	*Vaccinium myrtillus*	Native	–	0–3
mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	Native	–	0–3
Tree					
whitebark pine	PIAL	*Pinus albicaulis*	Native	–	5–10

Inventory data references

Physiographic and Soils features were gathered from the NASIS database.

Type locality

Location 1: Elko County, NV	
Township/Range/Section	T30 N R58 E S9
Latitude	40° 29′ 56″
Longitude	115° 26′ 4″
General legal description	Elko County, Nevada; Ruby Mountains up Long Canyon about 1110 feet down slope of the Ruby Crest Trail, on the west side; about 1,267 feet west and 1,632 feet south of the northeast corner of section 9., T. 30 N., R. 58 E.; USGS Franklin Lake NW 7.5 minute

Other references

Fryer, Janet L. 2002. *Pinus albicaulis*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2015, October 20].

Contributors

E. Hourihan

Approval

Kendra Moseley, 4/24/2024

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	05/05/2024
Approved by	Kendra Moseley
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:**

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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):**

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:**