Ecological site F043AY550ID
Warm-Frigid, Moist-Xeric, Unglaciated, Loamy, Hills and Mountains, Metasedimentary, Mixed Ash Grand fir/ mallow ninebark - common snowberry

Last updated: 10/14/2020
Accessed: 05/18/2024

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): 043A–Northern Rocky Mountains

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Description of MLRAs can be found in: United States 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.

Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook

LRU notes

Most commonly found in LRU 43A09 (Western Bitterroot Foothills). Climate parameters were obtained from PRISM and other models for the area. Landscape descriptors are derived from USGS DEM products and their derivatives.

Classification relationships

Relationship to Other Established Classifications:
United States National Vegetation Classification (2008) – A3362 Abies grandis – Pseudotsuga menziesii Central Rocky Mountain Forest & Woodland Alliance
Washington Natural Heritage Program. Ecosystems of Washington State, A Guide to Identification, Rocchio and Crawford, 2015 – Northern Rocky Mountain Mesic Montane Mixed Conifer Forest
Description of Ecoregions of the United States, USFS PN # 1391, 1995 - M333 Northern Rocky Mt. Forest-Steppe-Coniferous Forest-Alpine Meadow Province
Level III and IV Ecoregions of WA, US EPA, June 2010 – 15x Okanogan Highland Dry Forest, 15y Selkirk Mountains, 15v Northern Idaho Hills and Low Relief Mountains.
This ecological site includes the following USDA Forest Service Plant Association: ABRG/PHMA, (Williams et. al. 1995)

Ecological site concept

This ESD is distinguished by an overstory of grand fir and Douglas-fir and an understory shrub component of ninebark, oceanspray, snowberry and /or twinflower. It occurs on mountainsides. These soils have developed in mixed Mazama tephra deposits, loess and residuum or colluvium from metasedimentary rocks. The soils are deep or very deep and have adequate available water capacity to a depth of 40 inches. The soils are well-drained and do not have a water table within 30 inches of the surface at any time during the year.. This ESD fits into the National

Vegetation Standard's Grand Fir - Douglas-fir Central Rocky Mountain Forest & Woodland Alliance and Washington State's Natural Heritage Program's Northern Rocky Mt. Mesic Montane Mixed Conifer Forest.

Table 1. Dominant plant species

Tree	(1) *Pseudotsuga menziesii var. glauca* (2) *Abies grandis*
Shrub	(1) *Physocarpus malvaceus* (2) *Symphoricarpos albus*
Herbaceous	(1) *Galium trifidum* (2) *Bromus vulgaris*

Physiographic features

Physiographic Features
Landscapes: Mountains, Foothills
Landform: mountain slopes, hillslopes

Elevation (m): Total range = 540 to 1385 m
(1,770 to 4,545 feet)
Central tendency = 860 to 1070 m
(2,820 to 3,510 feet)

Slope (percent): Total range = 0 to 90 percent
Central tendency = 15 to 45 percent

Aspect: Total range: 80-225-10
Central tendency: 160-225-290

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Foothills > Hillslope
Flooding frequency	None
Ponding frequency	None
Elevation	860–1,070 m
Slope	15–45%
Water table depth	203 cm
Aspect	W, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None
Ponding frequency	None
Elevation	539–1,385 m
Slope	0–90%
Water table depth	203 cm

Climatic features

Climatic Features
Frost-free period (days): Total range = 80 to 135 days
Central tendency = 100 to 115 days

Mean annual precipitation (cm): Total range = 580 to 1160 mm
(23 to 46 inches)
Central tendency = 745 to 910 mm
(29 to 36 inches)
MAAT (C): Total range = 6.0 to 9.0
(43 to 48 F)
Central tendency = 6.9 to 7.8
(44 to 46 F)

Climate Stations: none

Influencing water features

Water Table Depth: >80 inches

Flooding:
Frequency: None
Duration: None

Ponding:
Frequency: None
Duration: None

Soil features

Representative Soil Features
This ecological subsite is associated with several soil components (e.g. Ardenvoir, Arson, Noil, Sharptop, and Cobbler). The soil components are: Vitrandic Haploxerepts, and Vitrandic Haploxeralfs. These soils have developed in mixed Mazama tephra deposits, loess and residuum or colluvium from metasedimentary rocks. The soils are deep or very deep and have adequate available water capacity to a depth of 1 m. The soils are well-drained.

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Loess (3) Colluvium–metasedimentary rock (4) Residuum–metasedimentary rock
Surface texture	(1) Gravelly, ashy silt loam (2) Ashy silt loam (3) Gravelly, ashy loam
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	122 cm
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	11.18 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Electrical conductivity (0-152.4cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-152.4cm)	6
Subsurface fragment volume <=3" (25.4-152.4cm)	20%

Subsurface fragment volume >3" (25.4-152.4cm)	0%

Table 5. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	102–203 cm
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.41–18.29 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Electrical conductivity (0-152.4cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-152.4cm)	5.4–7.3
Subsurface fragment volume <=3" (25.4-152.4cm)	0–85%
Subsurface fragment volume >3" (25.4-152.4cm)	0–50%

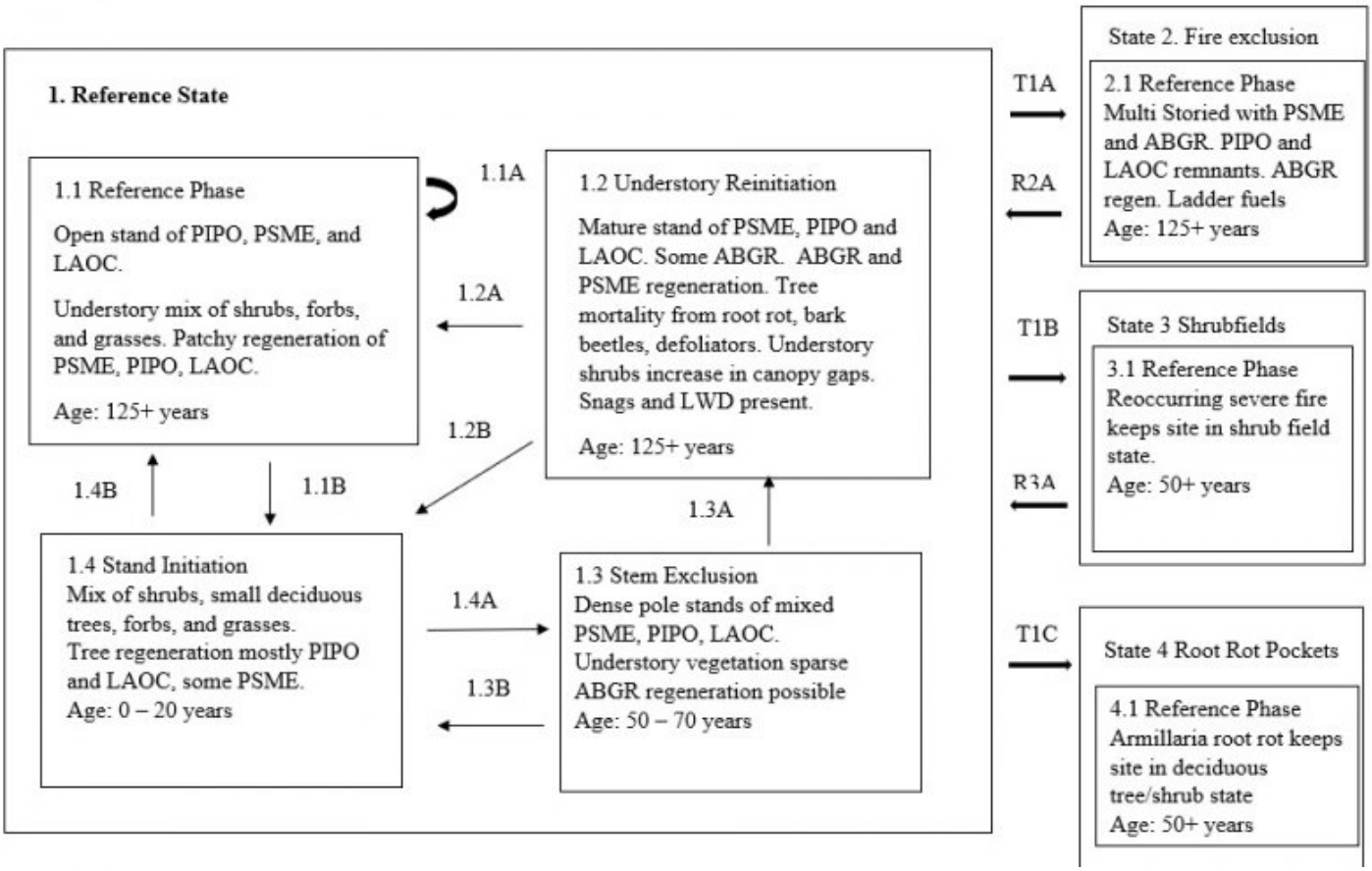
Ecological dynamics

Ecological Dynamics of the Site
This site is the warmest extent where grand fir can be an overstory component. As the temperature gradient gets warmer Douglas-fir and ponderosa pine habitat types occur. Above this temperature gradient (cooler) subalpine fir habitats exist. Relative to moisture this is the driest grand fir habitat type. As moister increases grand fir/herb, cedar, and cedar-hemlock habitat types occur. Fire disturbance is a major factor in mature stand development. Frequent fires create an open stand of western larch, ponderosa pine, and Douglas-fir with a mixed understory of shrubs, grass, and herbs. Mixed severity fires create a patchy forest overstory with shrubs and grass understory. Fire exclusion allows grand fir to establish and become an overstory component with Douglas-fir. Stands in this condition are subject to stand replacing fires. Root rot can become a problem in these older stands dominated by Douglas-fir and grand fir.
The moister end of this ES lies in Northern Idaho where grand fir is more prominent in stand composition and western larch can be a major stand component. As this ES extends westward into Washington, grand fir is near its ecological limit and is a minor stand component. Douglas-fir and ponderosa pine are the major tree species. In this warmer environment this ES looks very similar to the Douglas-fir/ninebark ES.

State and transition model

State and Transition Diagram

Ecological Site
Frigid Xeric Ashy Slopes (Grand Fir Warm Dry Shrub)
Grand fir / mallow ninebark



State 1
Reference

Frequent ground fires every 10 – 20 years create an open stand of mature ponderosa pine, western larch, and some Douglas-fir. Understory is a mix of grass and shrubs. Most of the scattered regeneration is pine and larch with some Douglas-fir and grand fir. Most of the herb component is pine grass with scattered ninebark, oceanspray, and snowberry. With infrequent fire the mature stand becomes denser and Douglas-fir and grand fir regeneration increases. Fire exclusion (State 2) for several years creates a multi-story Douglas-fir –grand fir stand with remnant pine and larch. Stands in this condition are more susceptible to stand replacing fires. Amillaria root rot mortality (State 4) can increase in Douglas-fir and grand fir creating deciduous tree/shrub pockets. Severe fires can lead to shrub dominated areas for long time periods (State 3).

Community 1.1
Reference Plant Community – Open Stand

This phase would be considered the historical plant community. Frequent low severity fires create an open stand of mostly large diameter 100+ year old ponderosa pine and western larch with some Douglas-fir. Tree regeneration is patchy consisting mainly of ponderosa pine, western larch with some Douglas-fir. Understory vegetation is a mix of shrubs, forbs and grasses (Open stand – Forest Restoration – Tree Removal and Burning)

Dominant plant species

- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- western larch (*Larix occidentalis*), tree
- ponderosa pine (*Pinus ponderosa*), tree
- grand fir (*Abies grandis*), tree
- oceanspray (*Holodiscus discolor*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- dwarf rose (*Rosa gymnocarpa*), shrub
- Saskatoon serviceberry (*Amelanchier alnifolia*), shrub
- white spirea (*Spiraea betulifolia*), shrub
- Oregon boxleaf (*Paxistima myrsinites*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub
- Columbia brome (*Bromus vulgaris*), grass
- pinegrass (*Calamagrostis rubescens*), grass
- Geyer's sedge (*Carex geyeri*), grass
- American trailplant (*Adenocaulon bicolor*), other herbaceous
- starry false lily of the valley (*Maianthemum stellatum*), other herbaceous
- Idaho goldthread (*Coptis occidentalis*), other herbaceous
- sweetcicely (*Osmorhiza berteroi*), other herbaceous
- Oregon drops of gold (*Prosartes hookeri var. oregana*), other herbaceous
- Piper's anemone (*Anemone piperi*), other herbaceous
- white hawkweed (*Hieracium albiflorum*), other herbaceous

Community 1.2
Understory Reinitiation

Mixed stand of mature ponderosa pine, western larch and Douglas-fir. Canopy gaps from tree mortality increase shrub understory. Douglas-fir and grand fir regeneration present. Bark beetle and root rot hazard increases. Snags and downed wood present. Ninebark, oceanspray, snowberry, and Douglas-maple key understory shrubs. Mixed severity fires and ground fires open up stand and create a patchy mosaic of openings for pine, larch, and Douglas-fir regeneration mixed with grass and shrubs.

Dominant plant species

- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- ponderosa pine (*Pinus ponderosa*), tree
- western larch (*Larix occidentalis*), tree
- grand fir (*Abies grandis*), tree
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- pinegrass (*Calamagrostis rubescens*), grass

Community 1.3
Stem Exclusion

Dense pole stands of pine, larch, and Douglas-fir. Understory sparse. Stand competition make stands susceptible to bark beetle attack. Grand fir regeneration possible in understory.

Dominant plant species

- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- ponderosa pine (*Pinus ponderosa*), tree
- western larch (*Larix occidentalis*), tree
- grand fir (*Abies grandis*), tree

Community 1.4
Stand Initiation

Stand replacing fires create dense shrub fields mixed with grass. Tree regeneration dependent on good seed source. Ponderosa pine and western larch usually most prominent regeneration. Douglas-fir regeneration sporadic. *Ceanothus velutinus* (snowbrush ceanothus), can dominate the site after fires and limit tree regeneration for 50+ years. Scouler willow and Douglas maple can also be prevalent along with pinegrass and elk sedge.

Dominant plant species

- ponderosa pine (*Pinus ponderosa*), tree
- western larch (*Larix occidentalis*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- snowbrush ceanothus (*Ceanothus velutinus*), shrub
- Scouler's willow (*Salix scouleriana*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- pinegrass (*Calamagrostis rubescens*), grass
- Geyer's sedge (*Carex geyeri*), grass

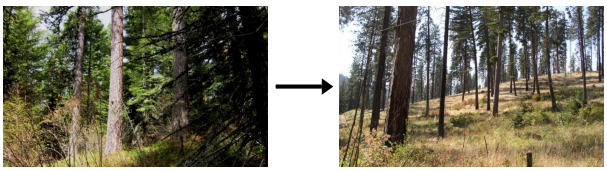
Pathway 1.1B
Community 1.1 to 1.4

Reference Plant Community – Open Stand

Stand Initiation

Stand replacing fire

Pathway 1.2A
Community 1.2 to 1.1



Understory Reinitiation

Reference Plant Community – Open Stand

Mixed severity and/or frequent low ground fires open up stand.

Pathway 1.2B
Community 1.2 to 1.4

Understory Reinitiation **Stand Initiation**

Stand replacing fire

Pathway 1.3A
Community 1.3 to 1.2

Stem Exclusion **Understory Reinitiation**

Time. Stand grows to mature stage, canopy gaps occur from overstory mortality.

Pathway 1.3B
Community 1.3 to 1.4

Stem Exclusion **Stand Initiation**

Stand replacing fire.

Pathway 1.4B
Community 1.4 to 1.1

Stand Initiation **Reference Plant Community – Open Stand**

Fire at 10 – 15 year intervals keep stand in open condition.

Pathway 1.4A
Community 1.4 to 1.3

Stand Initiation **Stem Exclusion**

Time. Seedlings/saplings grow to dense pole stage.

State 2
Fire Exclusion

This state develops with extended lack of fire and consists of all aged Douglas-fir and grand fir with scattered old ponderosa pine and western larch remnants. Tree canopy is multi-storied. Tree age ranges from 60-125+ years. Windthrow and root rot pockets create openings for shrub or tree regeneration. Many snags and down logs can be present. High fuel loads and ladder fuels create conditions for stand replacing fire.

Community 2.1
Reference Phase

All aged Douglas-fir and grand fir with scattered old ponderosa pine and western larch remnants. Tree canopy is multi-stored. Tree age ranges from 60-125+ years. Windthrow and root rot pockets create openings for shrub or tree regeneration. Many snags and down logs can be present. High fuel loads and ladder fuels create conditions for stand replacing fire.

State 3
Shrubfields

Reoccurring severe fire damages soil surface and shrubs dominate site for extended time period. Tree regeneration is sporadic or nonexistent. Ceanothus species would be a key component in this state. Other shrub species would include snowberry, ninebark, oceanspray, Douglas-maple, and Scouler willow.

Community 3.1
Reference Phase

Tree regeneration is sporadic or nonexistent. Ceanothus species would be a key component in this state. Other shrub species would include snowberry, ninebark, oceanspray, Douglas-maple, and Scouler willow.

Dominant plant species

- ceanothus (*Ceanothus*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub
- Scouler's willow (*Salix scouleriana*), shrub

State 4
Root Rot Sites

Large to small pockets of Armillaria root rot have killed Douglas-fir and grand fir pole to mature stands leaving site occupied by deciduous trees and shrubs and scattered conifers. Reestablishment to pine, larch, and fir overstory may take over 50 years depending on disturbance or root rot longevity. Ponderosa pine and western larch are more resistant to this root rot, however, seedlings and saplings can be killed. Root rot more severe on warm south and west exposures with metisedimentary and quartzite parent materials and overlying soils with less than 7 inches of volcanic ash (Vitrandic classification). Armillaria root disease causes by the fungus Armillaria ostoyae along with other root diseases such as Laminated root rot (Phellinus weirii) and Annosum root disease (Heterobasidion annosum) kill the overstory Douglas-fir and grand fir creating brush fields of aspen, maple, willow, ninebark, and oceanspray. Sporatic conifer tree regeneration may occur with the susceptibility of the mortality due to root disease. Ponderosa pine and western larch are less susceptible with potential establishment and survival. It may take several years for a mature conifer overstory to dominate these areas depending on the root disease longevity.

Community 4.1
Reference Phase

Armillaria root disease causes by the fungus Armillaria ostoyae along with other root diseases such as Laminated root rot (Phellinus weirii) and Annosum root disease (Heterobasidion annosum) kill the overstory Douglas-fir and grand fir creating brush fields of aspen, maple, willow, ninebark, and oceanspray. Sporadic conifer tree

regeneration may occur but is susceptible to mortality due to root disease. Ponderosa pine and western larch are less susceptible with potential establishment and survival. It may take several years for a mature conifer overstory to dominate these areas depending on the root disease longevity.

Dominant plant species

- ponderosa pine (*Pinus ponderosa*), tree
- western larch (*Larix occidentalis*), tree
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub
- Scouler's willow (*Salix scouleriana*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub

Transition T1A
State 1 to 2

Reference **Fire Exclusion**

Fire Exclusion

Transition T1B
State 1 to 3

Reference **Shrubfields**

Reoccurring severe fire with soil degradation keeping a shrubfield state

Transition T1C
State 1 to 4

Reference **Root Rot Sites**

Root rot pockets killing DF and GF creating a deciduous vegetation state

Restoration pathway R2A
State 2 to 1

Fire Exclusion **Reference**

Selective overstory removal with prescribed burning

Restoration pathway R3A
State 3 to 1

Shrubfields | Reference

Time. Stand grows to mature stage, canopy gaps occur from overstory mortality including mixed severity fire.

Additional community tables

Table 6. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
Rocky Mountain Douglas-fir	*PSMEG*	75	110	71	160	90	–	–	
Rocky Mountain Douglas-fir	*PSMEG*	64	107	65	158	90	–	–	
ponderosa pine	*PIPO*	98	120	99	141	40	–	–	
grand fir	*ABGR*	70	85	95	124	110	–	–	
western larch	*LAOC*	66	85	66	103	50	–	–	
western larch	*LAOC*	50	70	63	70	70	–	–	

References

. 1998. NRCS National Forestry Manual.

. 2017. NRCS Soil and Site Index data for NE WA and N. Idaho.

Cooper, S.V., K.E. Neiman, R. Steele, and D.W. Roberts. 1991. Forest Habitat types of Northern Idaho, A Second Approximation.

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Approval

Curtis Talbot, 10/14/2020

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	05/18/2024
Approved by	Curtis Talbot
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:**

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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:**
