Ecological site F006XA007WA
Warm Frigid Xeric Mountain Slopes (Douglas-fir Warm Dry Shrub/Herb)

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

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Stretching from northern Washington to southern Oregon, MLRA 6 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

Common Resource Area (CRA) 6.4 - Chelan Tephra Hills

This LRU occurs predominantly on slopes of foothills and mountains. The soils are dominantly in the Inceptisols and Mollisols taxonomic orders, with some Alfisols and Andisols . Soil parent materials are dominantly colluvium and residuum from igneous, sedimentary, and metamorphic rock, and glacial till, with a mantle or mixture of volcanic ash in the upper part. Taxonomic soil climate is primarily a frigid or mesic temperature regime and xeric moisture regime with average annual precipitation of about 28 inches.

Other LRU'S where the site occurs:
CRA 6.3 - Okanogan Pine / Fir Hills
CRA 6.5 - Chiwaukum Hills and Lowlands
CRA 6.6 - Yakima Plateau and Slopes

Classification relationships

CDS411 - Douglas-fir/Pachistima (PSME/PAMY)
CDS629 - Douglas-fir/Mountain Snowberry (PSME/SYOR)

CDS653 - Douglas-fir/Bearberry (PSME/ARUV)
CDS654 - Douglas-fir/Bearberry-Bitterbrush (PSME/ARUV-PUTR)

Ecological site concept

This ecological site is classified as Douglas-fir Warm Moderately Dry Shrub/Herb. The dominant tree species is Douglas-fir occurring on upper or middle warm dry slopes. Ponderosa pine is also a key tree component. Other tree species capable of being on site include lodgepole pine and western larch. Elevation ranges from 1400 to 4300 feet and precipitation ranges from 20 to 35 inches.

The following USFS plant associations are included in this ecological site:
Douglas-fir/Pachistima (PSME/PAMY)
Douglas-fir/Mountain Snowberry (PSME/SYOR)
Douglas-fir/Bearberry (PSME/ARUV)
Douglas-fir/Bearberry-Bitterbrush (PSME/ARUV-PUTR)

Douglas-fir/Pinemat Manzinita (PSME/ARNE) – Included from Yakima Indian Reservation

Associated sites

F006XA001WA	**Cool Frigid Xeric Ashy Slopes (Douglas-fir Cool Dry Grass)** On cooler, higher elevation sites.
F006XA002WA	**Mesic Xeric Hill Slopes and Terraces (Ponderosa Pine Hot Dry Grass)** On warmer, drier sites.
F006XB001WA	**Frigid Xeric Mountain Slopes (Douglas-fir Moderately Dry Shrub/Herb)** On moister, higher elevation sites. Associated in southern Chelan, Kittitas and Norther Yakima Co.

Similar sites

F006XB001WA	**Frigid Xeric Mountain Slopes (Douglas-fir Moderately Dry Shrub/Herb)** On moister, higher elevation sites. Associated in southern Chelan, Kittitas and Norther Yakima Co.

Table 1. Dominant plant species

Tree	(1) *Pseudotsuga menziesii* (2) *Pinus ponderosa*
Shrub	(1) *Symphoricarpos oreophilus* (2) *Arctostaphylos uva-ursi*
Herbaceous	(1) *Calamagrostis rubescens*

Physiographic features

This ecological site is on mountain slopes, structural benches, and plateaus. It is typically found between 1400 and 4300 feet in elevation on all aspects. Slope gradients generally range from 5 to 75 percent, but can be found on slopes up to 90 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Foothills > Structural bench (3) Plateau
Flooding frequency	None
Ponding frequency	None
Elevation	1,400–4,300 ft
Slope	5–75%

Water table depth	80 in
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None
Ponding frequency	None
Elevation	800–5,400 ft
Slope	2–90%
Water table depth	80 in

Climatic features

Mean Annual Air Temperature
Total Range: 40 to 48 degrees Fahrenheit
Central tendency: 42 to 46 degrees Fahrenheit

Table 4. Representative climatic features

Frost-free period (characteristic range)	85-130 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	20-35 in
Frost-free period (actual range)	70-150 days
Freeze-free period (actual range)	
Precipitation total (actual range)	15-50 in

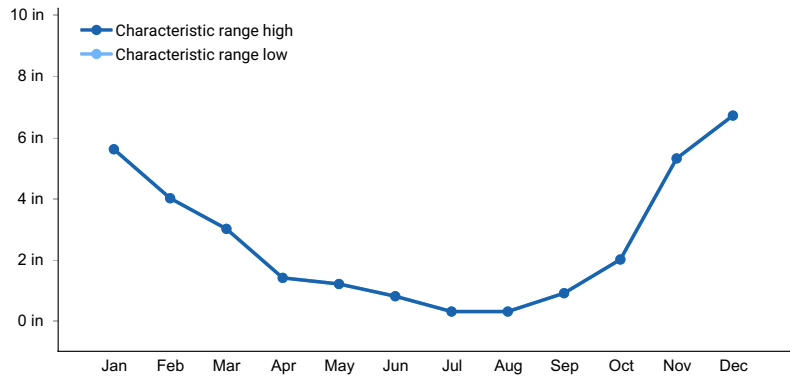


Figure 1. Monthly precipitation range

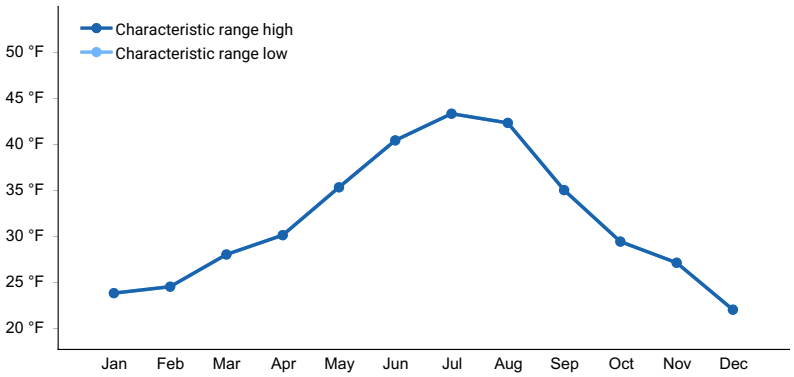


Figure 2. Monthly minimum temperature range

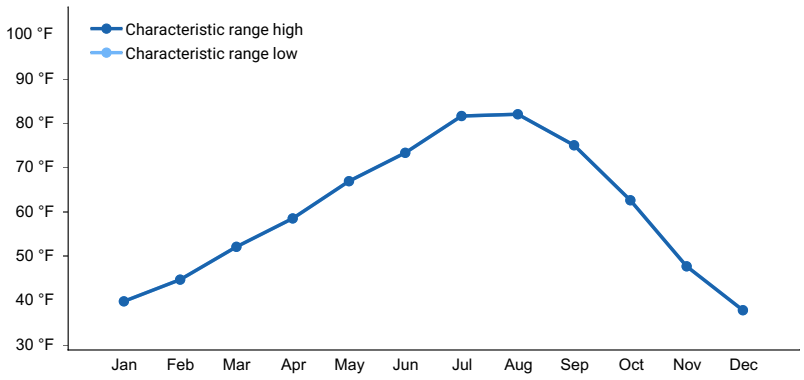


Figure 3. Monthly maximum temperature range

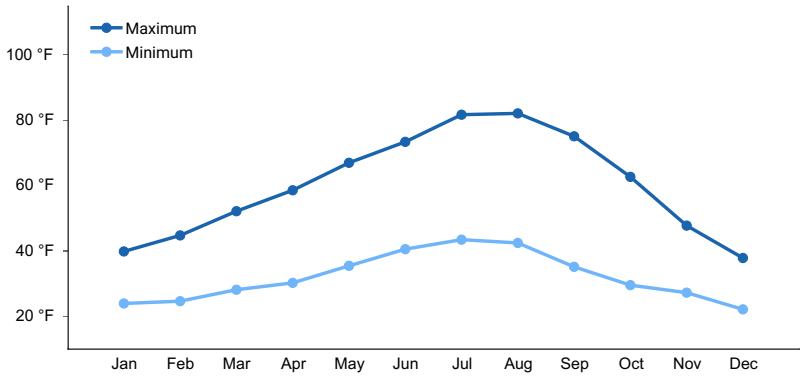


Figure 4. Monthly average minimum and maximum temperature

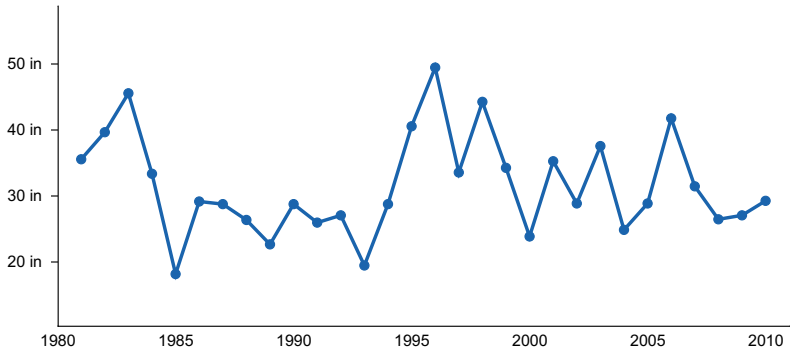


Figure 5. Annual precipitation pattern

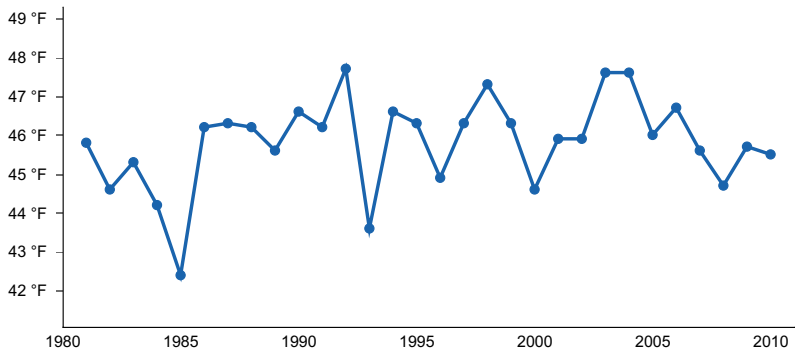


Figure 6. Annual average temperature pattern

Climate stations used

- (1) GLENWOOD #2 [USC00453184], Glenwood, WA

Influencing water features

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

Wetland description

N/A

Soil features

This ecological site is associated with several soil map unit components. The components are dominantly Andic Haploxerepts in the Inceptisols order and Vitrandic Haploxerolls in the Mollisols order. Soils are dominantly moderately deep to very deep and have average available water capacity of about 3.8 inches in the 0 to 40 inches (0 to 100 cm) depth range. Soil parent material is dominantly volcanic ash deposits over glacial till, and colluvium and residuum from granitic, volcanic, metamorphic, and sedimentary rock.

Dominant Soil Series: Kaiders, Klicker, McCree, Nicmar, Palmich, Presher, Safety, Shalrock, Trouter

Parent Materials:
Kind – colluvium, residuum, glacial till, volcanic ash, loess
Origin – volcanic rock, sedimentary rock, granitic rock, metamorphic rock, mixed sources

Table 5. Representative soil features

Surface texture	(1) Ashy sandy loam (2) Ashy fine sandy loam (3) Ashy loam
Family particle size	(1) Loamy-skeletal (2) Fine-loamy (3) Coarse-loamy
Drainage class	Well drained
Depth to restrictive layer	20–60 in
Surface fragment cover <=3"	0–19%
Surface fragment cover >3"	0–35%
Available water capacity (0-40in)	1.2–7.3 in
Soil reaction (1:1 water) (0-40in)	5.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	2–40%
Subsurface fragment volume >3" (Depth not specified)	0–45%

Ecological dynamics

This ecological site is classified as Douglas-fir Warm Moderately Dry Shrub/Herb. The dominant tree species is Douglas-fir occurring on upper or middle warm dry slopes. Ponderosa pine is also a key tree component. Other tree species capable of being on site include lodgepole pine and western larch. Elevation ranges from 1400 to 4300 feet and precipitation ranges from 20 to 35 inches. This site is characterized with open stands with a shrub understory of bearberry, mountain snowberry, bitterbrush, or big sagebrush depending on location. Other shrubs could include serviceberry, buffaloberry, spirea, and ceanothus. Main herbs could include pinegrass, bluebunch wheatgrass, elk sedge, lupine, yarrow, and arrowleaf balsamroot.

The following USFS plant associations are included in this ecological site:
Douglas-fir/Pachistima (PSME/PAMY)
Douglas-fir/Mountain Snowberry (PSME/SYOR)
Douglas-fir/Bearberry (PSME/ARUV)

Douglas-fir/Bearberry-Bitterbrush (PSME/ARUV-PUTR)

Douglas-fir/Pinemat Manzinita (PSME/ARNE) – Included from Yakima Indian Reservation

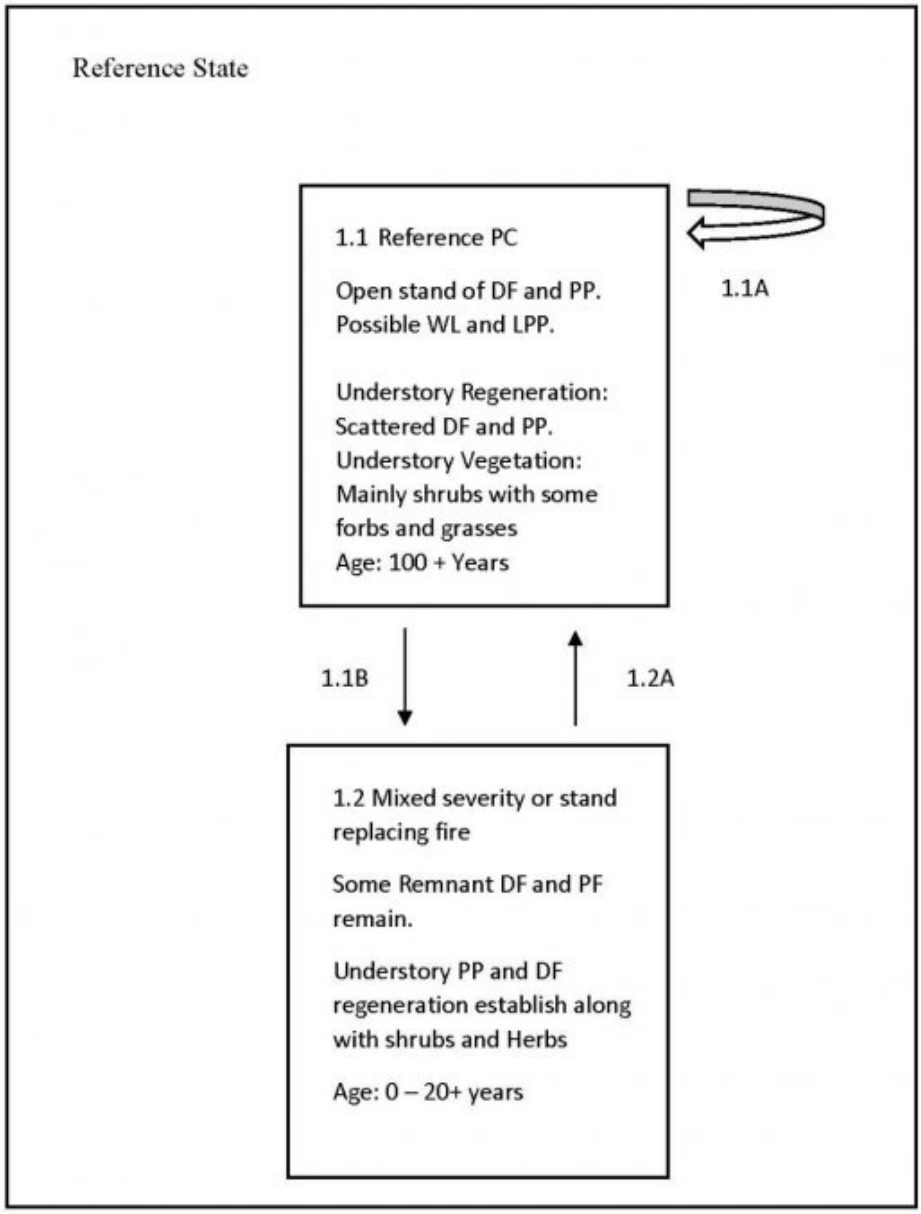
The most prominent plant associations respectively are PSME/ARUV-PUTR, PSME/SYOR, PSME/ARNE, and PSME/ARUV.

Early fire regimes were frequent low severity creating open stands of pine and Douglas-fir. These stands today are still moderately open due to site conditions, however, fuel buildup from lack of fire can lead to more severe fire.

Major insects affecting Douglas-fir are the Douglas-fir engraver, Douglas-fir beetle, western spruce bark beetle, and tussock moth.. Major diseases in Douglas-fir are Annosum root diseases, and laminated and Armillaria root rots. Dwarf mistletoe can be a problem in Douglas-fir, western larch, and lodgepole pine. Major insects affecting ponderosa pine include the western pine beetle, mountain pine beetle, and pine engraver.

Site productivity is relatively low due site location and gravelly soils. Douglas-fir average site index range is 55-65 (Cochran 1979b (765) 50 year BHA). Ponderosa pine average site index range is 60 – 75 (Meyer 1961 (600) 100 year TA)

State and transition model



State 1
Reference State

Community 1.1
Reference PC

Open stand of DF and PP. Possible WL and LPP. Understory Regeneration: Scattered DF and PP. Understory Vegetation: Mainly shrubs with some forbs and grasses Age: 100 + Years

Resilience management. 1.1A – Frequent low severity ground fires keep open stand conditions maintaining reference plant community 1.1

Dominant plant species

- Douglas-fir (*Pseudotsuga menziesii*), tree
- ponderosa pine (*Pinus ponderosa*), tree
- western larch (*Larix occidentalis*), tree
- lodgepole pine (*Pinus contorta*), tree
- bitterbrush (*Purshia*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- buffaloberry (*Shepherdia*), shrub
- spirea (*Spiraea*), shrub
- snowbrush ceanothus (*Ceanothus velutinus*), shrub
- big sagebrush (*Artemisia tridentata*), shrub
- pinegrass (*Calamagrostis rubescens*), grass
- bluebunch wheatgrass (*Pseudoroegneria spicata*), grass
- elk sedge (*Carex garberi*), grass
- lupine (*Lupinus*), other herbaceous
- common yarrow (*Achillea millefolium*), other herbaceous
- arrowleaf balsamroot (*Balsamorhiza sagittata*), other herbaceous

Community 1.2
Mixed severity or stand replacing fire

Some Remnant DF and PP remain. Understory PP and DF regeneration establish along with shrubs and Herbs Age: 0 – 20+ years

Dominant plant species

- Douglas-fir (*Pseudotsuga menziesii*), tree
- ponderosa pine (*Pinus ponderosa*), tree

Pathway 1.1B
Community 1.1 to 1.2

Time. Lack of frequent ground fire. Understory shrubs and tree regeneration become ladder fuels. Severe to mixed severity fire replaces most of existing stand and understory.

Pathway 1.2A
Community 1.2 to 1.1

Time. Tree regeneration grows and shrubs/herbs increase. Low severity fires begin to occur again to create reference plant community 1.1.

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
Douglas-fir	*PSME*	55	65	–	–	–	–	–	
ponderosa pine	*PIPO*	60	75	–	–	–	–	–	

Inventory data references

Forest Service Plant Associations:
CDS411 - Douglas-fir/Pachistima (PSME/PAMY)
CDS629 - Douglas-fir/Mountain Snowberry (PSME/SYOR)
CDS653 - Douglas-fir/Bearberry (PSME/ARUV)
CDS654 - Douglas-fir/Bearberry-Bitterbrush (PSME/ARUV-PUTR)

Yakama Nation Habitat Type:
40 - Douglas-fir/Pinemat Manzinita (PSME/ARNE)

The most prominent plant associations respectively are PSME/ARUV-PUTR, PSME/SYOR, PSME/ARNE, and PSME/ARUV.

Other references

Field Guide for Forest Plant Associations of the Wenatchee National Forest. Lillybridge et al. PNW-GTR-359. October 1995

Washington Natural Heritage Program. Ecosystems of Washington State, A Guide to Identification, Rocchio and Crawford, 2015 - Northern Rocky Mt. Dry-Mesic Montane Mixed Conifer Forest (D. Fir – Pine)

USDA, NRCS Forest-Soil ecological classifications.

Contributors

Gary Kuhn
Steve Campbell
Carri Gaines

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	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:

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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:**