

Ecological site F029XY096NV PIMO-ABCOC WSG 3R0607 16 to 18

Last updated: 2/20/2025
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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): 029X–Southern Nevada Basin and Range

The Southern Nevada Basin and Range MLRA (29) represents the transition from the Mojave Desert to the Great Basin. It is cooler and wetter than the Mojave. It is warmer and typically receives more summer precipitation than the Great Basin. This area is in Nevada (73 percent), California (25 percent), and Utah (2 percent). It makes up about 26,295 square miles (68,140 square kilometers). Numerous national forests occur in the area, including the San Bernardino, Angeles, Sequoia, Inyo, Humboldt-Toiyabe, and Dixie National Forests. Portions of Death Valley National Monument, the Nuclear Regulatory Commission's Nevada Test Site, the Hawthorne Ammunition Depot, and the Nellis Air Force Range in Nevada and the China Lake Naval Weapons Center in California also are in this MLRA. The northeast part of the Paiute Indian Reservation and the southern third of the Walker River Indian Reservation are in the part of this MLRA in Nevada, and the Lone Pine, Fort Independence, and Big Pine Indian Reservations are in the part in California.

Physiography:

The entire area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The area of broad, nearly level, aggraded desert basins and valleys between a series of mountain ranges trending north to south. The basins are bordered by sloping fans and pluvial lake terraces. The mountains are uplifted fault blocks with steep side slopes and not well dissected due to limited annual precipitation. Most of the valleys in this MLRA are closed basins or bolsons containing sinks or playa lakes.

Geology:

The mountains are dominated by Pliocene and Miocene andesite and basalt rocks, Paleozoic and Precambrian carbonate rocks prominent in some areas. Scattered outcrops of older Tertiary intrusives and very young tuffaceous sediments (Pliocene and Miocene) are in the western and eastern thirds of this MLRA. The valleys consist mostly of alluvial fill and playa deposits at the lowest elevations in the closed basins.

Climate:

The average annual precipitation is 3 to 12 inches (75 to 305 millimeters) in most of this area. It may be as high as 29 inches (735 millimeters), on the higher mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Summers are dry, but sporadic storms are common in July and August.

Water Resources:

Water resources are scarce. Ground water and surface water sources are limited. Streams are small and intermittent. Quality of surface water is naturally degraded as streams cross area of valley fill effected by dissolved salts. Irrigation water may raise the levels of dissolved salts and suspended sediments causing contamination.

Soils:

Dominant soil orders include Entisols and Aridisols.

Ecological site concept

The Shallow Bouldery Loam 16-18"P.Z. occurs on northerly-facing mountain sideslopes. Slopes range from 30 to 75 percent. Typical elevation range is 6500 to 7700 feet. Soils are typically shallow and well drained. The soils have extreme amounts of very large, exfoliating ignimbritic boulders on the surface.

The Shallow Bouldery Loam 16-18" P.Z. was previously known as PIMO-ABCOC WSG 3R0607 16 to 18.

Associated sites

F029XY069NV	PIMO-JUOS WSG 0R0504 12 to 16 Juniper dominated on shallow soil.
R029XY040NV	LIMESTONE HILL Mahogany dominated on shallow soil.
R029XY080NV	SHALLOW SANDY LOAM 5-8 P.Z. Juniper dominated on shallow soil.

Similar sites

F029XY086NV	Rocky Loamy Slope 16+ The Rocky Loamy Slope 16+ site is dominated by Ponderosa pine and occurs on mountain sideslopes of mostly northerly aspects at the lower elevations of its range and on all aspects at higher elevations. Slopes range from 30 to over 75 percent, but are typically 30 to 50 percent. Elevations are 6200 to about 7600 feet. Soils are typically deep to bedrock and well drained.
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Table 1. Dominant plant species

Tree	(1) <i>Abies concolor</i> var. <i>concolor</i> (2) <i>Pinus monophylla</i>
Shrub	(1) <i>Amelanchier utahensis</i>
Herbaceous	(1) <i>Poa fendleriana</i>

Physiographic features

The Shallow Bouldery Loam 16-18" P.Z. community occurs on northerly-facing mountain sideslopes. Slopes range from 30 to 75 percent. Elevations are 6500 to 7700 but can go up to 10200 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Runoff class	High
Flooding frequency	None
Ponding frequency	None
Elevation	1,981–3,109 m
Slope	30–75%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate associated is arid, characterized by cold, moist winters and warm, dry summers. Average annual precipitation is 16 to about 18 inches. Mean annual air temperature is 44 to 48 degrees F. The average frost-free period is 80 to 110 days. There is no climate station associated with this site.

Table 3. Representative climatic features

Frost-free period (average)	110 days
Freeze-free period (average)	
Precipitation total (average)	457 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

Soils are typically shallow and well drained. These soils have extreme amounts of very large, exfoliating ignimbrite boulders on the surface. Available water capacity is very low, but trees and shrubs extend their roots into fractures in the bedrock allowing them to utilize deep moisture. Runoff is high to very high and potential for sheet and rill erosion is moderate to severe depending on slope. Soil temperature regime is frigid and soil moisture regime is xeric. The soil series associated with this site are Chanybuck, Eganroc, and Hardzem.

Table 4. Representative soil features

Parent material	(1) Colluvium–volcanic rock
Surface texture	(1) Extremely bouldery sandy loam (2) Extremely stony sandy loam (3) Very stony loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderately rapid
Soil depth	13–25 cm
Surface fragment cover <=3"	5–40%
Surface fragment cover >3"	10–32%
Available water capacity (0-101.6cm)	0.76–4.83 cm
Calcium carbonate equivalent (0-101.6cm)	0–25%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	18–55%
Subsurface fragment volume >3" (Depth not specified)	7–34%

Ecological dynamics

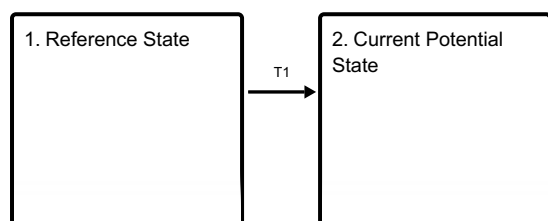
Fire Ecology:

Young white fir is highly susceptible to fire, and mature trees are only moderately fir tolerant. White fir is an aggressive, shade-tolerant species that will seed into the understory of low-elevation ponderosa or Jeffrey pine stands or into mixtures of ponderosa pine, Douglas-fir, quaking aspen, and southwestern white pine. Thin bark and lack of self pruning make singleleaf pinyon very susceptible to intense fire. Mature singleleaf pinyon can survive

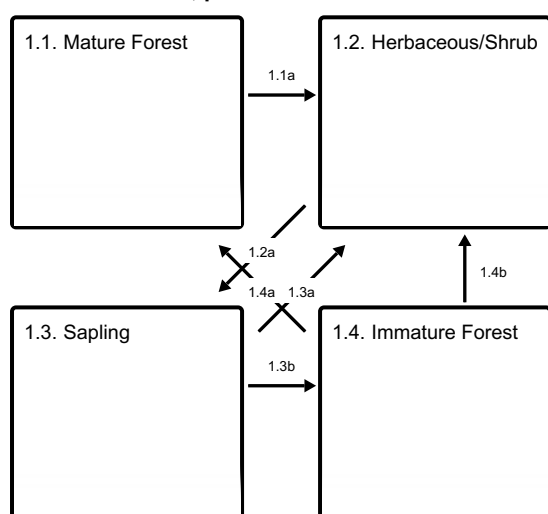
low-severity surface fires but is killed by more severe fires. Most tree seedlings are killed by fire, but cached seeds may survive. Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. Aboveground parts of Utah serviceberry may be killed or consumed under fire conditions with sufficient flame lengths. Utah serviceberry may be slightly harmed by fire, depending on moisture conditions, but is generally considered to be fire tolerant. Utah serviceberry sprouts from the root crown following fire. Soil moisture is important to aid sprouting. Muttongrass is unharmed to slightly harmed by light-severity fall fires. Muttongrass appears to be harmed by and slow to recover from severe fire. Sandberg bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur. Thurber's needlegrass is moderately resistant, but depending on season of burn, phenology, and fire severity, this perennial bunchgrass is moderately to severely damaged by fire. Early season burning is more damaging to this needlegrass than late season burning. Bottlebrush squirreltail's small size, coarse stems, and sparse leafy material aid in its tolerance of fire. Postfire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Frequency of disturbance greatly influences postfire response of bottlebrush squirreltail. Undisturbed plants within a 6 to 9 year age class generally contain large amounts of dead material, increasing bottlebrush squirreltail's susceptibility to fire.

State and transition model

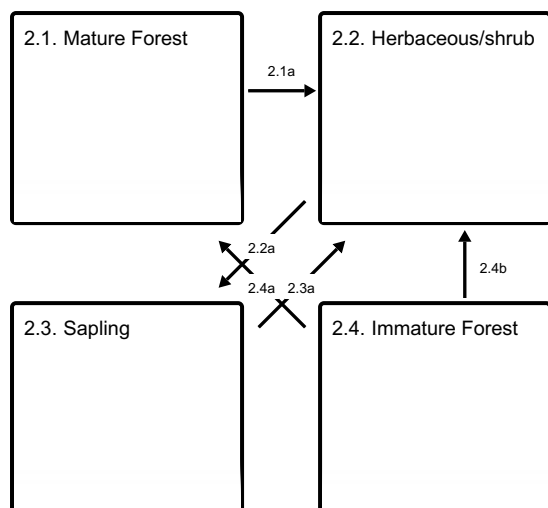
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1 Reference State

The Community Phases in the Reference State are influenced by crown removing disturbances. These disturbances open the understory to increased light and opportunity for shade intolerant species to establish. Over time, trees will close the canopy again.

Community 1.1 Mature Forest

The reference plant community is dominated by singleleaf pinyon and white fir. Utah serviceberry is the principal understory shrub. Muttongrass is the most prevalent understory grasses. Overstory tree canopy composition is about 40 to 60 percent singleleaf pinyon and 60 to 40 percent white fir. An overstory canopy cover of about 30 percent is assumed to be representative of tree dominance on this site in the pristine environment.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	67	90	135
Shrub/Vine	50	67	101
Tree	34	45	67
Forb	17	22	34
Total	168	224	337

Community 1.2 Herbaceous/Shrub

Vegetation is dominated by grasses and forbs under full sunlight. This stage is experienced after a major disturbance such as crown fire. Skeleton forest (dead trees) remaining after fire or residual trees left following harvest have little or no affect on the composition and production of the herbaceous vegetation. Various amounts of tree seedlings (less than 20 inches in height) may be present up to the point where they are obviously a major component of the vegetal structure.

Community 1.3 Sapling

In the absence of disturbance the tree seedlings develop into saplings (20 inches to 4.5 feet in height) with a range in canopy cover of about 5 to 10 percent. Vegetation consists of grasses, forbs and shrubs in association with tree saplings.

Community 1.4

Immature Forest

The visual aspect and vegetal structure are dominated singleleaf pinyon trees greater than 4.5 feet in height. The upper crown of dominant and co-dominant trees are cone or pyramidal shaped. Seedlings and saplings of pinyon and white fir are present in the understory. Dominants are the tallest trees on the site; co-dominants are 65 to 85 percent of the highest of dominant trees. Understory vegetation is moderately influenced by a tree overstory canopy of about 10 to 20 percent.

Pathway 1.1a

Community 1.1 to 1.2

Crown removing disturbance, such as fire.

Pathway 1.2a

Community 1.2 to 1.3

Time since last disturbance.

Pathway 1.3a

Community 1.3 to 1.2

Tree removing disturbance, such as fire.

Pathway 1.3b

Community 1.3 to 1.4

Time since last disturbance.

Pathway 1.4a

Community 1.4 to 1.1

Time since last disturbance.

Pathway 1.4b

Community 1.4 to 1.2

Crown removing disturbance, such as fire.

State 2

Current Potential State

Similar to the Reference State, except the Community Phases in the Current Potential State have non-native plant species in the plant community.

Community 2.1

Mature Forest

Similar to Community Phase 1.1, however 2.1 has established non-native plant species. The visual aspect and vegetal structure are dominated by pinyon and white fir that have reached or are near maximal heights for the site. Dominant trees average greater than five inches in diameter at one-foot stump height. Upper crowns of singleleaf pinyon and white fir are typically either irregularly or smoothly flat-topped or rounded. Tree canopy cover ranges from 20 to 35 percent. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Non-native plant species have established in the understory.

Community 2.2

Herbaceous/shrub

Similar to Community Phase 1.2, except 2.2 contains non-native plant species.

**Community 2.3
Sapling**

Similar to Community Phase 1.3, except 2.3 contains non-native plant species.

**Community 2.4
Immature Forest**

Similar to Community Phase 1.4, except 2.4 contains non-native plant species.

**Pathway 2.1a
Community 2.1 to 2.2**

Crown removing disturbance, such as fire.

**Pathway 2.2a
Community 2.2 to 2.3**

Time since last disturbance.

**Pathway 2.3a
Community 2.3 to 2.2**

Tree removing disturbance.

**Pathway 2.4a
Community 2.4 to 2.1**

Time since last tree removal disturbance.

**Pathway 2.4b
Community 2.4 to 2.2**

Crown removing disturbance, such as fire.

**Transition T1
State 1 to 2**

Establishment of non-native plant species.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			56–114	
	muttongrass	POFE	<i>Poa fendleriana</i>	22–54	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	11–20	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	11–20	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	11–20	–
2	Secondary Perennial Grasses			6–25	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	2–11	–
	pine needlegrass	ACPI2	<i>Achnatherum pinetorum</i>	2–11	–
	sedge	CAREX	<i>Carex</i>	1–2	–
Forb					
3	Perennial			7–34	
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	2–11	–
	lupine	LUPIN	<i>Lupinus</i>	2–11	–
	phlox	PHLOX	<i>Phlox</i>	2–11	–
Shrub/Vine					
4	Primary Shrubs			34–74	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	22–54	–
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	11–20	–
5	Secondary Shrubs			7–25	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	2–11	–
	currant	RIBES	<i>Ribes</i>	2–11	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	1–2	–
	mormon tea	EPVI	<i>Ephedra viridis</i>	1–2	–
Tree					
6	Evergreen			34–74	
	singleleaf pinyon	PIMO	<i>Pinus monophylla</i>	22–54	–

Animal community

Livestock Interpretations:

This site is not suited to grazing of domestic livestock due to extreme amounts of large boulders on the soil surface. Stands dominated by white fir seldom produce enough forage for domestic livestock grazing except on harvested or open forest sites, or where grasses and sedges dominate the understory. Because they contain resins, terpenes, and other substances that make the foliage irritating to the digestive tract, most conifers are not particularly palatable to grazing animals. White fir may be slightly palatable to goats. Pinyon pine forestlands are considered to have poor palatability for cattle, sheep, and horses. Mountain big sagebrush is eaten by domestic livestock but has long been considered to be of low palatability, and a competitor to more desirable species. Utah serviceberry provides good browse for domestic sheep and domestic goats. In the spring, Utah serviceberry provides fair forage for cattle and good to excellent browse for domestic sheep and goats. Utah serviceberry provides good forage late in winter and in early spring, because it leafs out and blooms earlier than associated species. Muttongrass is excellent forage for domestic livestock especially in the early spring. Muttongrass begins growth in late winter and early spring, which makes it available before many other forage plants. Sandberg bluegrass is a palatable species, but its production is closely tied to weather conditions. It produces little forage in drought years, making it a less dependable food source than other perennial bunchgrasses. Thurber's needlegrass species begin growth early in the year and remain green throughout a relatively long growing season. This pattern of development enables

animals to use Thurber's needlegrass when many other grasses are unavailable. Cattle prefer Thurber's needlegrass in early spring before fruits have developed as it becomes less palatable when mature. Thurber's needlegrasses are grazed in the fall only if the fruits are softened by rain. Bottlebrush squirreltail is very palatable winter forage for domestic sheep of Intermountain ranges. Domestic sheep relish the green foliage. Overall, bottlebrush squirreltail is considered moderately palatable to livestock.

Wildlife Interpretations:

This site has high value for mule deer during the summer, fall and early-winter. The trees on this site provide shelter from summer heat, winter cold and insects. It is also used by various song birds, rodents, reptiles and associated predators natural to the area.

Hydrological functions

Runoff is high to very high. Permeability is slow to moderately rapid.

Recreational uses

The aspect of this site is dominated by very large boulders that inhibit many forms of recreation. The site has potential for hiking, nature study, camping and deer, sheep and upland game hunting.

Wood products

PRODUCTIVE CAPACITY

This forestland community is of very low site quality for white fir production. Site Index for white fir is less than 30 (Schumacker, 1926).

This forestland community is of low site quality for singleleaf pinyon production. Site Index for singleleaf pinyon ranges from about 40 to 55 (Howell, 1940).

Productivity Class: white fir <3.6

singleleaf pinyon 0.2 to 0.4

CMAI* (white fir): <50 ft³/ac/yr;

<3.6 m³/ha/yr.

Culmination is estimated to be at 70 years.

CMAI* (pinyon): 3.3 to 5.2 ft³/ac/yr;

0.23 to 0.36 m³/ha/yr.

Culmination is estimated to be at 90 years.

*CMAI: is the culmination of mean annual increment or highest average growth rate of the stand in the units specified.

Due to severe limitations of this site to tree harvest (steep slopes and high amounts of surface boulders), tree products are not addressed.

MANAGEMENT GUIDES AND INTERPRETATIONS

1. LIMITATIONS AND CONSIDERATIONS

Severe equipment limitations due to steep slopes and the many large boulders on the soil surface.

2. ESSENTIAL REQUIREMENTS

Protect soils from accelerated erosion.

3. SILVICULTURAL PRACTICES

Silvicultural treatments are not economically feasible on this site due to severe limitations for equipment and tree harvest.

Other products

White fir is a valuable ornamental tree. It is often used for ornamental plantings in rural and urban landscapes in northern US cities, because it is attractive and frost-hardy. White fir is used extensively in the Christmas tree industry. White fir needles were used to make tea by Native Americans. The pitch of singleleaf pinyon was used by Native Americans as an adhesive, caulking material, and a paint binder. It may also be used medicinally and chewed like gum. Pinyon seeds are a valuable food source for humans, and a valuable commercial crop. Native Americans used big sagebrush leaves and branches for medicinal teas, and the leaves as a fumigant. Bark was woven into mats, bags and clothing. Utah serviceberry fruits were used by Native Americans and early European explorers in North America for food and medicine.

Other information

Utah serviceberry has been used to revegetate big game winter range and for surface stabilization. It grows slowly from seed and therefore transplanting may be more successful than seeding for revegetation projects. Bottlebrush squirreltail is tolerant of disturbance and is a suitable species for revegetation.

Table 7. 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
	<i>ABCOC</i>	15	28	40	50	—	—	—	
singleleaf pinyon	<i>PIMO</i>	30	55	3	5	—	—	—	

Inventory data references

NASIS data used to populate abiotic narratives and tables.

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T5S R62E S16
General legal description	Section 16, T5S. R62E. MDBM. About 7 air miles southwest of Pahroc Summit Pass on USHwy 93, South Pahroc Range, Lincoln County, Nevada.

Other references

Howell, J., 1940. Pinyon and juniper: a preliminary study of volume, growth, and yield. Regional Bulletin 71. Albuquerque, NM: USDA, SCS; 90p.

Jordan, M., 1974. An Inventory of Two Selected Woodland Sites in the Pine Nut Hills of Western Nevada. Master's Thesis, UNReno.

Schumacker, F.X., 1926. Normal Yield Tables for White Fir. Calif Ag Exp Sta Bulletin 407.

United States Department of Agriculture, Natural Resources Conservation Service. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture, Agriculture Handbook 296.

USDA-NRCS. 1980. National Forestry Manual - Part 537. Washington, D.C.

Contributors

Gary Brackley

Approval

Kendra Moseley, 2/20/2025

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	05/12/2025
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:**

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:

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:**
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