

Ecological site R030XC039NV SHALLOW LIMESTONE SLOPE 9-11 P.Z.

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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.

Ecological site concept

This site occurs on mountain backslopes. Slopes range from 30 to 75 percent. Elevations range from 5000 to 7500 feet. The soils associated with this site are very shallow, well drained soils that formed in residuum and colluvium from limestone.

This site is part of group concept R030XC036NV.

Associated sites

F030XC251NV	QUARTZITE SLOPES
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Similar sites

R030XC017NV	LIMESTONE HILL 13+ P.Z. Higher elevations, ERCO40 important shrub.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Cercocarpus intricatus</i> (2) <i>Ephedra viridis</i>
Herbaceous	(1) <i>Achnatherum parishii</i> var. <i>depauperatum</i>

Physiographic features

This site occurs on mountain backslopes. Slopes range from 30 to 75 percent. Elevations

range from 5000 to 7500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Elevation	5,000–7,500 ft
Slope	30–75%
Aspect	Aspect is not a significant factor

Climatic features

The climate is sub-humid continental with cool, moist winters and occasional summer thundershowers typical of higher elevations in the Mojave Desert. Average annual precipitation is 9 to 11 inches. Mean annual air temperature is 51 to 56 degrees F. The average growing season is about 90 to 135 days.

Table 3. Representative climatic features

Frost-free period (average)	150 days
Freeze-free period (average)	
Precipitation total (average)	11 in

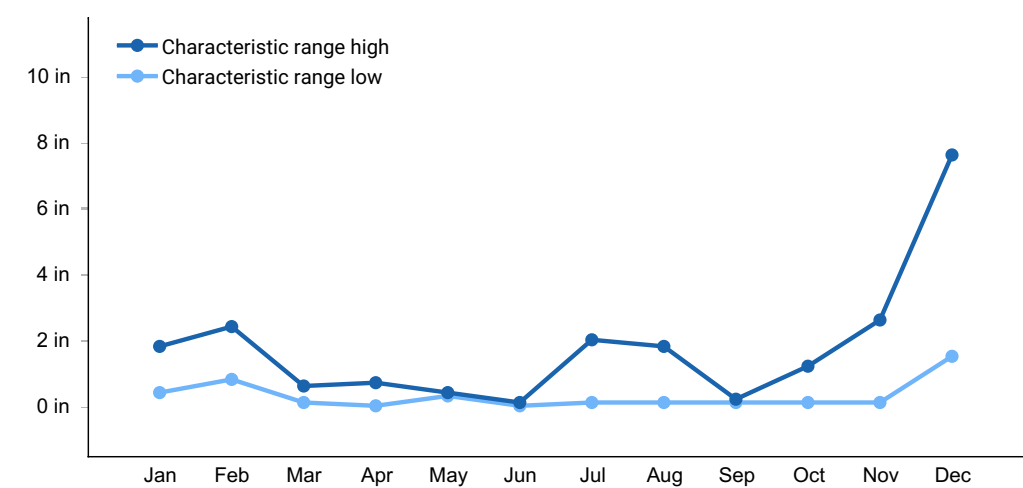


Figure 1. Monthly precipitation range

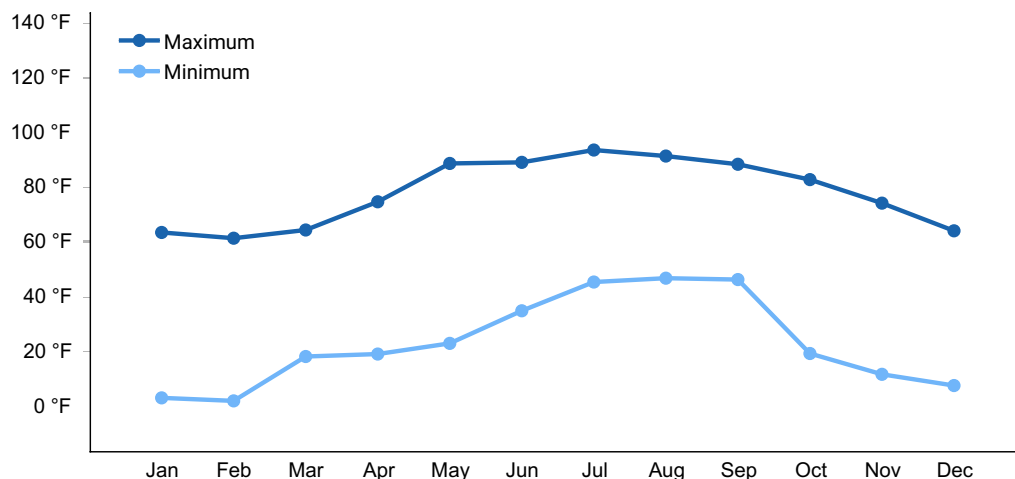


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are very shallow, well drained soils that formed in residuum and colluvium from limestone. These soils have very high runoff, moderately rapid permeability and low available water holding capacity. The soils are characterized by a mesic temperature regime and an aridic moisture regime that borders on ustic. The soils are usually dry, but will be moist in some part during later winter and early spring and intermittently moist in the upper part following summer convection storms. Soil series associated with site include Ednagrey, classified as a loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents.

Table 4. Representative soil features

Parent material	(1) Residuum–limestone (2) Colluvium–limestone
Surface texture	(1) Extremely gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	7–8 in
Surface fragment cover <=3"	60–70%
Surface fragment cover >3"	1–5%
Available water capacity (0-40in)	0.12–0.21 in

Calcium carbonate equivalent (0-40in)	5–10%
Electrical conductivity (0-40in)	0–5 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	8.3–8.4
Subsurface fragment volume ≤3" (Depth not specified)	35–70%
Subsurface fragment volume >3" (Depth not specified)	0–1%

Ecological dynamics

Essentially, two mahogany populations occupy the same stand; one composed of dominant mature plants in the overstory and the other of suppressed individuals in the understory. The plant communities of this site are dynamic in response to changes in disturbance regimes and weather patterns. Community phase changes are primarily driven by long term drought and infrequent wildfire.

Littleleaf mahogany likes full sun and well-drained soils and has low water requirements once established. Soils supporting stands of mountain mahogany have increased levels of nitrogen. Mountain mahogany has root nodules capable of fixing nitrogen, increasing the levels of total nitrogen thereby influencing plant succession. Suppressed individuals are capable of surviving for a 100 or more years, but once released, grow rapidly. Large scale disturbance was infrequent in pre-settlement times. Small scale disturbances from lightning, low severity fire, insects, wind and snow are abundant. These small disturbances create canopy gaps in dense stands of mahogany, gaps allow for the release of immature littleleaf mountain mahogany.

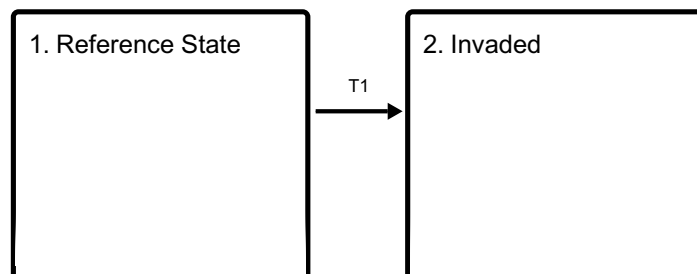
Fire Ecology:

Wildfire is infrequent and occurs due to the natural buildup of woody fuels. Ignitions commonly occur during lightning storms associated with summer monsoonal storms. Fires have long lasting effects on the structure and composition of this plant community, due to the long recovery periods. Post-fire plant communities will be characterized by a decrease in mature littleleaf mountain mahogany and a release of suppressed mahogany plants present in the understory. Invasive non-native annuals will also increase following wildfire. The historic fire regime of littleleaf mountain mahogany communities probably varied with community type and structure. The estimated fire return interval is > 100 years. Littleleaf mountain mahogany is moderately damaged by fire and there is very little sprouting following fire. Green ephedra generally sprouts vigorously from the roots or woody root crown after fire and rapidly produces aboveground biomass from surviving meristematic

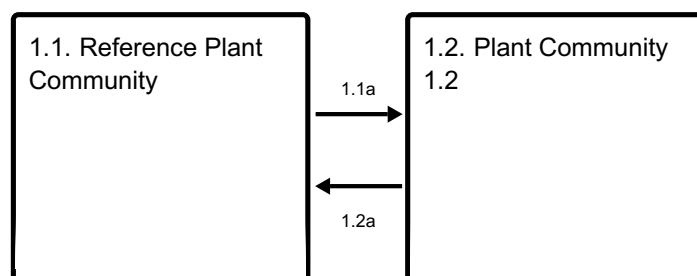
tissue. Parish needlegrass is damaged by burning due to the dense plant material that can burn slowly and long, charring to the growing points. Late summer and early fall fires are the least harmful. Muttongrass is unharmed to slightly harmed by light-severity fall fires. Muttongrass appears to be harmed by and slow to recover from severe fire.

State and transition model

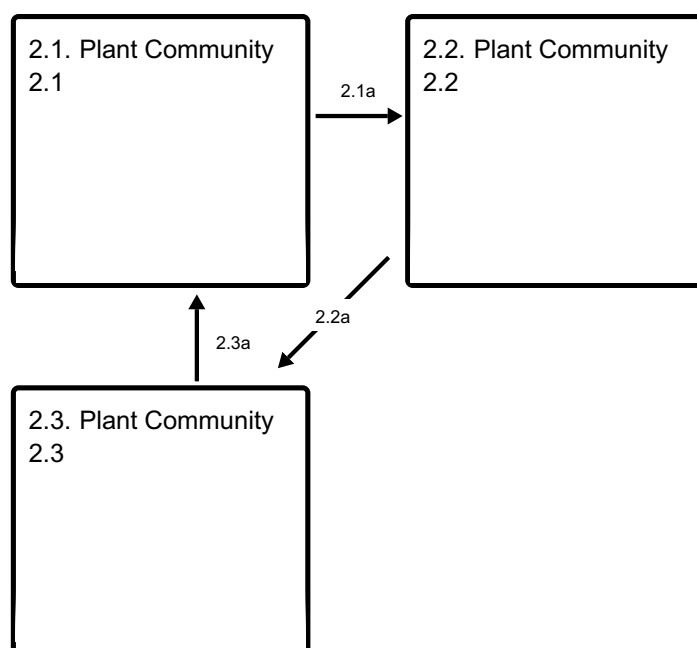
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1 Reference State

The reference state is representative of the natural range for variability under pristine conditions. Primary natural disturbance mechanisms affecting this ecological site are infrequent wildfire, prolonged drought and insect attack. Historically, infrequent wildfire

occured due to the natural build up of woody fuels and lightning strikes. Plant communities of this site are stable, long-lived and dynamic in response to changes in disturbance regimes and weather patterns.

Community 1.1

Reference Plant Community

The reference plant community is dominated by littleleaf mountain mahogany. Parish's needlegrass, muttongrass and green ephedra are important species associated with this site. Potential vegetative composition is about 10 percent grasses, 10 percent forbs and 80 percent shrubs and trees. Approximate ground cover (basal and crown) is about 25 to 35 percent. Shrub diversity is high, common species include Yucca, sagebrush and spiny greaseweb. Trees are present in trace amounts. Periodic small scale disturbances are required for perpetuation of littleleaf mountain mahogany communities.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	276	395	553
Grass/Grasslike	35	50	70
Forb	35	50	70
Tree	4	5	7
Total	350	500	700

Community 1.2

Plant Community 1.2

This plant community is representative of a post-disturbance, early to mid seral plant community phase. Native woody perennials are recovering from disturbance. Post-disturbance plant communities are heavily dominated by herbaceous vegetation. Suppressed littleleaf mountain mahogany individuals respond favorably to open canopy and full sunlight. This plant community is at-risk of invasion by non-native annuals, such as red brome. Non-natives take advantage of increased availability of critical resources following wildfire or other disturbance.

Pathway 1.1a

Community 1.1 to 1.2

Wildfire, prolonged drought and/or insect attack.

Pathway 1.2a

Community 1.2 to 1.1

Absence from disturbance and natural regeneration over time.

State 2

Invaded

The invaded state is characterized by the presence of non-natives in the understory. Ecological function has not been compromised at this time, however the presence of non-natives has reduced ecological resilience of the site. A biotic threshold has been crossed with the introduction of non-natives that are very difficult to remove from the system and have the potential to significantly alter disturbance regimes from their historic range of variation. These non-natives annuals are highly flammable and can promote wildfires where fires historically have been infrequent.

Community 2.1

Plant Community 2.1

This plant community is compositionally similar to the reference plant community, with the presence of non-native species in the understory. Littleleaf mountain mahogany, green ephedra and other shrubs persist through invasion, however perennial bunchgrasses and desirable forbs may suffer from increased competition.

Community 2.2

Plant Community 2.2

This plant community is characterized by decreased cover of mature native woody perennials. Early successional post-fire plant communities are heavily dominated by herbaceous vegetation, which may or may not be non-native annual grasses. Sprouting shrubs quickly recover and provide favorable microsites for the establishment of other shrubs. Removal of dominant overstory releases suppressed mahogany individuals in the understory, perpetuating existing plant community.

Community 2.3

Plant Community 2.3

This plant community phase is characterized by recovering native woody perennials. Sprouting species may increase in cover following wildfire. Dominant shrubs serve as nurse plants for tree seedlings. Abundance of non-native biomass varies annual depending on weather. Droughty conditions can favor native perennials and decrease abundance of non-natives.

Pathway 2.1a

Community 2.1 to 2.2

Wildfire, prolonged drought and/or insect attack.

Pathway 2.2a

Community 2.2 to 2.3

Absence from disturbance and natural regeneration over time.

Pathway 2.3a

Community 2.3 to 2.1

Absence from disturbance and natural regeneration over time.

Transition T1

State 1 to 2

Introduction of non-native species due to a combination of factors including: 1) surface disturbance, 2) changes in the kinds of animals and their grazing patterns, 3) drought and/or 4) changes in fire history.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			35–75	
	little Parish's needlegrass	ACPAD	<i>Achnatherum parishii</i> var. <i>depauperatum</i>	25–50	–
	muttongrass	POFE	<i>Poa fendleriana</i>	10–25	–
2	Secondary Perennial Grasses			1–25	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	3–15	–
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	3–15	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	3–15	–
	squirreldtail	ELEL5	<i>Elymus elymoides</i>	3–15	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	3–15	–
Forb					
3	Perennial Forbs			25–50	
	Wyoming Indian paintbrush	CALI4	<i>Castilleja linariifolia</i>	3–10	–
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	3–10	–
	Fendler's sandmat	CHFE3	<i>Chamaesyce fendleri</i>	3–10	–

	basin yellow cryptantha	CRCO12	<i>Cryptantha confertiflora</i>	3–10	–
	Navajo fleabane	ERCO27	<i>Erigeron concinnus</i>	3–10	–
	Cooper's rubberweed	HYCO2	<i>Hymenoxys cooperi</i>	3–10	–
4	Annual Forbs			1–10	
	purple bird's-beak	COPA9	<i>Cordylanthus parviflorus</i>	3–10	–
Shrub/Vine					
5	Primary Shrubs			300–375	
	littleleaf mountain mahogany	CEIN7	<i>Cercocarpus intricatus</i>	250–300	–
	mormon tea	EPVI	<i>Ephedra viridis</i>	50–75	–
6	Secondary Shrubs			50–100	
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	3–15	–
	blackbrush	CORA	<i>Coleogyne ramosissima</i>	3–15	–
	Heermann's buckwheat	ERHE	<i>Eriogonum heermannii</i>	3–15	–
	green rabbitbrush	ERTE18	<i>Ericameria teretifolia</i>	3–15	–
	Apache plume	FAPA	<i>Fallugia paradoxa</i>	3–15	–
	spiny greasebush	GLSP	<i>Glossopetalon spinescens</i>	3–15	–
	threadleaf snakeweed	GUMI	<i>Gutierrezia microcephala</i>	3–15	–
	desert almond	PRFA	<i>Prunus fasciculata</i>	3–15	–
	Stansbury cliffrose	PUST	<i>Purshia stansburiana</i>	3–15	–
	desert snowberry	SYLO	<i>Symphoricarpos longiflorus</i>	3–15	–
	turpentinebroom	THMO	<i>Thamnosma montana</i>	3–15	–
	banana yucca	YUBA	<i>Yucca baccata</i>	3–15	–
	Joshua tree	YUBR	<i>Yucca brevifolia</i>	3–15	–
	pricklypear	OPUNT	<i>Opuntia</i>	1–3	–
	Wiggins' cholla	CYEC3	<i>Cylindropuntia echinocarpa</i>	1–3	–
	hedgehog cactus	ECHIN3	<i>Echinocereus</i>	1–3	–
Tree					
7	Trees			0–7	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	0–5	–
	singleleaf pinyon	PIMO	<i>Pinus monophylla</i>	0–5	–

Animal community

Livestock Interpretations:

This site has limited value for livestock grazing, due to the low forage production, high elevations and steep slopes. Grazing management should be keyed to dominant grasses and palatable shrub production. Cattle and sheep will feed on littleleaf mountain mahogany slightly in the winter, but it is generally of minor significance to livestock. Green ephedra is heavily browsed by livestock on winter range but only moderately or lightly browsed during other seasons. Little Parish's needlegrass provides a palatable, nutritious feed during the spring and early summer for livestock. Muttongrass is excellent forage for domestic livestock especially in the early spring. Muttongrass begins growing in late winter and early spring, which makes it available before many other forage plants.

Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year.

Wildlife Interpretations:

This ecological site is home to various species of bats, cottontail rabbits and ground squirrels. Coyotes, bobcats and the gray fox can also be found. The coyote scavenges berries and plant materials as well as hunting small mammals and the occasional bird. Mountain lions also utilize this ecological site to hunt their preferred prey of mule deer. Various species of sparrows, flycatchers and thrushes plus several other species of birds periodically use this ecological site, as it is associated with their preferred habitat. Littleleaf mountain mahogany is good winter browse for deer and elk. Green ephedra is an important winter browse species for big game animals. Little Parish's needlegrass provides a palatable, nutritious feed during the spring and early summer for wildlife. Deer and elk make heavy use of muttongrass, especially in early spring when other green forage is scarce. Depending upon availability of other nutritious forage, deer may use muttongrass in all seasons. Muttongrass cures well and is an important fall and winter deer food in some areas.

Hydrological functions

Runoff is very high. Permeability is moderately rapid.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities to photographers and for nature study. This site is used for hiking and has potential for upland and big game hunting.

Other products

The wood of mountain mahogany is extremely hard and in some areas has been extensively used as firewood. Some Native American tribes used it for bow construction. The more important use of mountain mahogany was for medical purposes. The bark was dried and used to treat tuberculosis, colds and other respiratory problems. Powdered bark was used to soothe sores and wounds and tea made from the bark and leaves was revered as a remedy for everything from heart disease to stomachaches (Mozingo 1987). Mormon tea or ephedra was traditionally used a beverage and medicine. Native Americans made tea from the slender twigs and inner bark by boiling them. The beverage was used as tonic and blood purifier. However, ephedra is considered toxic and should be used with caution.

Other information

Green ephedra is listed as a successful shrub for restoring disturbed lands. It also has value for reducing soil erosion on both clay and sandy soils. Green ephedra establishes readily through direct seeding, transplants, and stem cuttings.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T17S R61E S28
UTM zone	N
UTM northing	4035766
UTM easting	665151
Latitude	36° 27' 10"
Longitude	115° 9' 25"
General legal description	USGS Gass Peak NV 7.5 minute quadrangle. Located near Quail Spring in the Desert National Wildlife Refuge. Approximately 2.5 miles from the mouth of Peek-a-boo Canyon, west northwest of U.S. Highway 93. Clark County, Nevada.

Other references

Fire Effects Information System (Online; <http://www.fs.fed.us/database/feis/plants/>).

USDA-NRCS Plants Database (Online; <http://www.plants.usda.gov>).

Mozingo, H. 1987. Shrubs of the Great Basin. University of Nevada Press.

Contributors

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PN-E

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	State Rangeland Management Specialist
Date	08/16/2011
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none to rare. Rock fragments armor the surface.

2. **Presence of water flow patterns:** Water flow patterns are none to rare. A few may occur after summer convection storms, usually in the interspaces between shrubs.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Typically less than 10%.

5. **Number of gullies and erosion associated with gullies:** None

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values should be 3 to 6 on most soil textures found on this site. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically moderately very thick platy. Soil surface colors are light and soils are typified by an ochric epipedon. Organic matter of the surface 0 to 2 inches is <1 percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Dense shrub canopy and associated litter break raindrop impact and allow for snow capture on this site. Deep-rooted perennial grasses increase infiltration and control runoff.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Massive subsurface horizons should not be mistaken for compaction.

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: evergreen tall shrubs

Sub-dominant: associated shrubs

Other: deep-rooted, cool-season, perennial grasses > rhizomatous warm-season, grasses > shallow-rooted, cool-season perennial grasses > annual forbs.

Additional: Reference Plant Community: evergreen tall shrubs (littleleaf mountain mahogany) >> associated shrubs > deep-rooted, cool-season, perennial grasses > perennial forbs > rhizomatous warm-season, grasses > shallow-rooted, cool-season perennial grasses > annual forbs. Other: evergreen trees

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 25% of total woody canopy; mature bunchgrasses commonly ($\pm 25\%$) have dead centers.
 14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (15-25%) and depth ($\pm \frac{1}{4}$ -inch).
 15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season ± 500 lbs/ac
 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:** Potential invaders on this site include cheatgrass.
 17. **Perennial plant reproductive capability:** All functional groups should reproduce in above average growing season years. Less reproduction will occur in below-average precipitation years.
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