Ecological site R030XB074NV
COBBLY LOAM 5-7 P.Z.

Last updated: 2/26/2025
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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.

Ecological site concept

This site occurs on sideslopes and summits of fan remnants on all exposures. Slopes range from 0 to 30 percent, but slope gradients of 2 to 15 percent are typical. Elevations are 2000 to 4000 feet.

The soil associated with this site have formed in mixed alluvium from limestone and dolomite and are very shallow or shallow to a duripan or petracalcic layer.

Please refer to R030XB029NV to view the group provisional concept.

Associated sites

R030XB075NV	**GRAVELLY FAN 5-7 P.Z.**

Similar sites

R030XB075NV	**GRAVELLY FAN 5-7 P.Z.** More productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Larrea tridentata* (2) *Ambrosia dumosa*
Herbaceous	(1) *Pleuraphis rigida* (2) *Muhlenbergia porteri*

Physiographic features

This site occurs on sideslopes and summits of fan remnants on all exposures. Slopes range from 0 to 30 percent, but slope gradients of 2 to 15 percent are typical. Elevations are 2000 to 4000 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant
Elevation	610–1,219 m
Slope	0–30%

Climatic features

The climate is hot and arid, with mild winters and very hot summers. Precipitation is greatest in the winter with a lesser secondary peak in summer, typical of the Mojave Desert. Average annual precipitation is 5 to 7 inches. Mean annual air temperature is 57 to 63 degrees F. The average growing season is about 180 to about 300 days.

Table 3. Representative climatic features

Frost-free period (average)	300 days
Freeze-free period (average)	
Precipitation total (average)	178 mm

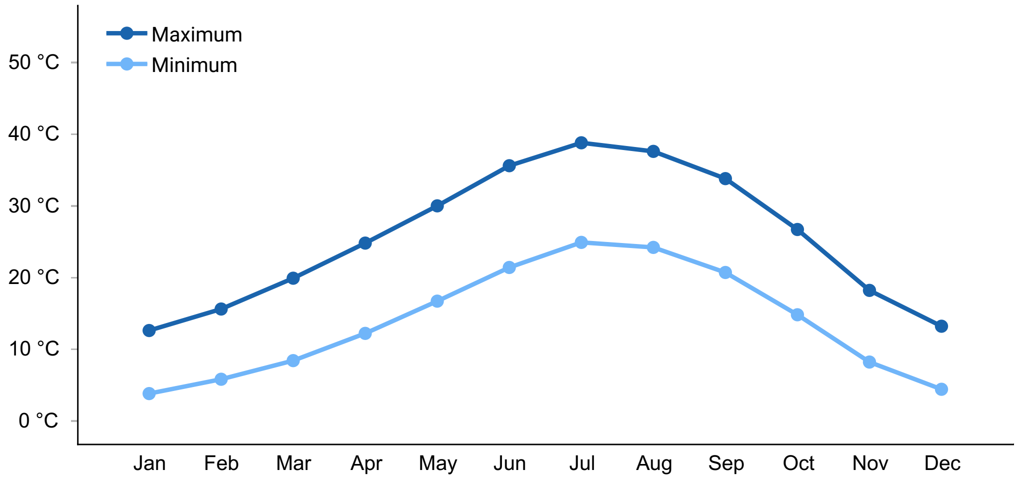


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soil associated with this site have formed in mixed alluvium from limestone and dolomite and are very shallow or shallow to a duripan or petracalcic layer. These soils are well drained, have very high runoff and moderately rapid permeability. Available water holding capacity is very low. Soil series correlated to this site include Upperline (loamy-skeletal, carbonatic, thermic Typic Haplocalcid) and Wechech (loamy-skeletal, carbonatic, thermic, shallow Calcic Petrocalcid).

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone (2) Colluvium–limestone (3) Residuum–sandstone and siltstone
Surface texture	(1) Very gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	99–152 cm
Surface fragment cover <=3"	45–85%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	2.54–7.62 cm
Calcium carbonate equivalent (0-101.6cm)	40–60%
Electrical conductivity (0-101.6cm)	0–5 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	8.4–8.8
Subsurface fragment volume <=3" (Depth not specified)	40–65%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

White bursage generally dominates more developed soils with the ability to hold moisture in the upper soil profile. The shallow roots of white bursage are able to effectively use moisture stored in the upper horizons when it is available and survive for extended periods of time when it is not (Hamerlynck et al. 2002). White bursage is not able to dominate the deep, weakly developed, coarse textured soils that store water deep in the profile, which is ideal for Larrea. The spatial distribution of soils allows shite bursage and creosotebush to share dominance on these ecological sites. White bursage and creosotebush can share dominance throughout the successional process, although the relative abundance is likely to change (Marshall 1994). Creosotebush commonly uses white bursage as a nurse plant, young creosotebushes are frequently found rooted beneath mature white bursage plants (Marshall 1995). White bursage is well adapted to the desert environment but prolonged periods of drought will result a reduction of biomass and possibly kill the plant. Under natural conditions, low available fuel and low fire return interval allowed the establishment of long-lived desert perennial communities.

Fine, sandy alluvium on these sites provides material that the wind redistributes to mound-like coppice dunes beneath creosotebush canopies. Heights of coppice dunes increase as a function of creosotebush cover and are tallest on young alluvial surfaces. Moisture absorbed by and stored in the coppice dune enhances plant performance, in turn contributing to the plant's effectiveness as a windbreak allowing for further deposition of eolian sands (McAuliffe et al 2007). Nutrient concentrations in this shrub community are spatially variable. Nutrient resources are concentrated under shrub canopy relative to the interspaces, called islands of fertility (Kieft et al. 1998).

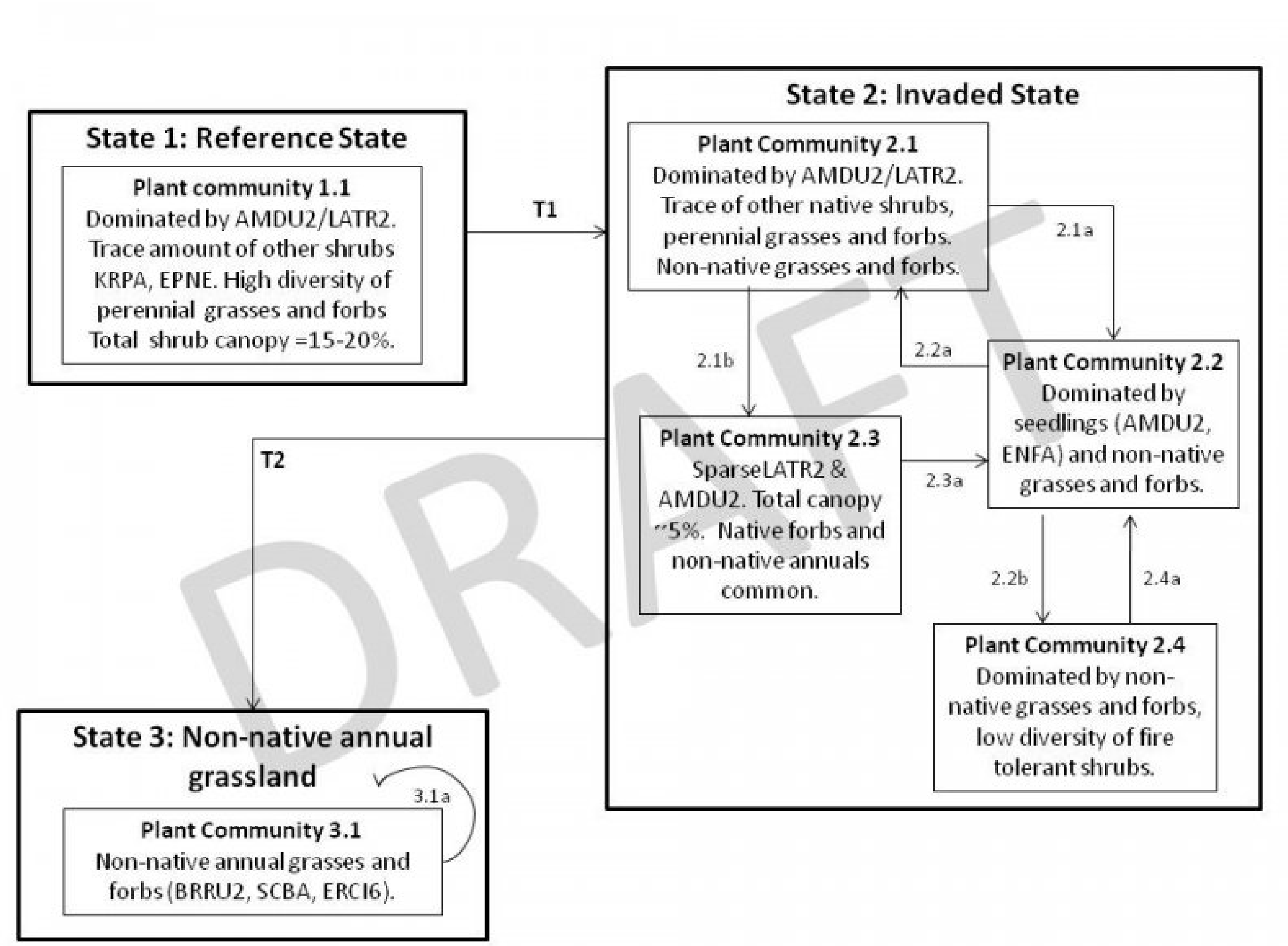
White bursage and creosotebush dominated shrublands are susceptible to wildfire resulting from annual variations in rainfall. Years with increased rainfall stimulate the growth of non-native annual grasses creating a continuous fuel bed that facilitates the spread of fire (Brooks and Matchett 2006). However, the creosotebush dominated ecotone has a low potential of conversion to an annual grassland. Years of elevated precipitation rarely occur, precluding the development of an extensive layer of herbaceous biomass required to significantly change the local fire dynamics.

The primary effect of fire is the reduction of perennial shrub cover. White bursage has little success resprouting post fire. However, regeneration from seed has been observed to be successful several years post fire (Brown and Minnich 1986). Creosotebush recovers poorly following fire. It very rarely resprouts and establishment by seed is very slow (Brown and Minnich 1986). Damage to big galleta varies, though it is generally top-killed. If big galleta is dry, the damage may be severe. When plants are green, the damage is less, survival is likely and the plants will most likely resprout from rhizomes.

Initial post-burn plant communities in the white bursage/creosotebush ecotone will be composed primarily of brittlebush and white bursage seedlings, as well as, herbaceous vegetation, including an abundance of non-native annuals (cheatgrass, red brome, Mediterranean grass, and red stem filiaree). Brown and Minnich (1986) observed brittlebush seedlings to be prolific on burned Larrea sites the first growing season post-fire. Big galleta, white bursage and Opuntia spp. were observed on burned sites after the first growing season.

Large scale disturbances, such as fire, have long-term impacts on the species composition and structure of this plant community, due to the slow recovery of long-lived desert perennials. The loss of shrub cover results in overall habitat degradation. Disturbances, natural and anthropogenic alike, that result in the removal of the native vegetation increase the likelihood of habitat invasibility. Plants adapted to the Mojave Desert have phenotypic specialization and tolerances, making it difficult for alien plants to establish. However, disturbance can decrease the cover and competitive ability of natives, increasing the available nutrients and favoring the establishment of non-natives (Brooks 1999). Recently, dramatic changes have occurred in the mid-elevation zone occupied by this ecological site, which has resulted in the establishment of an annual grassland fire regime. The conversion occurs because non-native annuals often dominate the post fire landscape due to their efficient use of nutrient and light resources. The fuel conditions they produce can increase the size, decrease the spatial variability, and shorten the time interval between fires in the Mojave Desert (Brooks and Matchett 2006). The amount of area that burns in the mid-elevation shrubland is strongly tied to the production of fine fuels produced by non-native annuals following years of high rainfall.

State and transition model



State 1
Reference Plant Community

This state represents the natural range of variability under pristine conditions. Community phase changes are primarily driven by long-term drought and insect attack. Wildfire is infrequent and patchy in this ecological site due to low fuel loading and widely spaced shrubs.

Community 1.1
Reference Plant Community

The reference plant community is dominated by white bursage, spiny menodora, creosotebush, and big galleta. Potential vegetative composition is about 25% grasses, 5% forbs and 70% shrubs. Approximate ground cover (basal and crown) is 5 to 15 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	118	196	314
Grass/Grasslike	43	71	112
Forb	8	13	22
Total	**169**	**280**	**448**

State 2
Invaded State

The Invaded State is characterized by the presence of non-native annuals in the understory. A biotic threshold has been crossed, with the introduction of non-native annuals that cannot be removed from the system. The resiliency of the state has been reduced by the presence of non-native annual species that have the potential to alter disturbance regimes significantly from their natural or historic range of variability.

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. Ecological processes remain largely unchanged at this time.

Community 2.2
Plant Community 2.2

This plant community is dominated by seedlings of native species tolerant of post fire conditions and non-native annuals. Limited creosotebush and other mature shrubs will remain, surviving individuals act as nurse plants. Seedlings are dominated by white bursage and brittlebush.

Community 2.3
Plant Community 2.3

This plant community is characterized by heavy disturbance. Total shrub canopy is reduced. Remaining vegetation exists as islands on the landscape. Non-natives are able to persist with increased disturbance. Shrubs experience reduced vigor due to increased soil compaction.

Community 2.4
Plant Community 2.4

This plant community is characterized by an increased in non-native annual biomass. This plant community is identified as “at-risk”. Few species from the reference community remain in this community phase due to unfavorable conditions created by a shorter fire return interval.

Pathway 2.1a
Community 2.1 to 2.2

This plant community is characterized by an increased in non-native annual biomass. This plant community is identified as “at-risk”. Few species from the reference community remain in this community phase due to unfavorable conditions created by a shorter fire return interval.

Pathway 2.1b
Community 2.1 to 2.3

Heavy reoccurring disturbance decrease shrub canopy. Mature shrubs experience high rates of mortality.

Pathway 2.2a
Community 2.2 to 2.1

Natural regeneration over time and absence of fire shrubs mature and densities increase.

Pathway 2.2b
Community 2.2 to 2.4

Reoccurring fire favors establishment non-native annuals and excludes native woody perennials.

Pathway 2.3a
Community 2.3 to 2.2

Natural regeneration overtime and continued absence of fire and/or removal of disturbance native perennial seedlings establish from adjacent in-tack shrub communities.

Pathway 2.4a
Community 2.4 to 2.2

Natural regeneration over time and the absence of fire allows shrub seedlings to establish from nearby seed source.

State 3
Non-native annual grassland

An abiotic threshold has been crossed, triggered by a frequent and repeated wildfire. This alternative stable state is extremely persistent due to strong feedbacks, including fire regimes, energy capture and nutrient cycling.

Community 3.1
Plant Community 3.1

This plant community is characterized by frequent fire return interval and a monoculture of non-native annual grasses. Native species are unable to establish and persist in the presence of increased fire, favoring the establishment of annual grassland.

Transition 1
State 1 to 2

Introduction of non-native species due to anthropogenic disturbances including OHV use, dry land farming, grazing, linear corridors, mining, military operations, and settlements.

Transition 2
State 2 to 3

Frequent and repeated fire excludes woody vegetation and favors the establishment of non-native annual grassland.

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**			15–65	
	big galleta	PLRI3	*Pleuraphis rigida*	13–43	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	1–22	–
2	**Secondary Perennial Grasses**			6–13	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–6	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	1–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	1–6	–
3	**Annual Grasses**			1–9	
Forb					
4	**Perennial forbs**			6–22	
	globemallow	SPHAE	*Sphaeralcea*	1–6	–
	princesplume	STANL	*Stanleya*	1–6	–
5	**Annual forbs**			1–9	
Shrub/Vine					
6	**Primary shrubs**			83–169	
	burrobush	AMDU2	*Ambrosia dumosa*	56–84	–
	creosote bush	LATR2	*Larrea tridentata*	13–43	–
	spiny menodora	MESP2	*Menodora spinescens*	13–43	–
7	**Secondary shrubs**			13–56	
	Fremont's chaffbush	AMFR2	*Amphipappus fremontii*	3–15	–
	cottontop cactus	ECPO2	*Echinocactus polycephalus*	3–15	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	3–15	–
	California barrel cactus	FECY	*Ferocactus cylindraceus*	3–15	–
	water jacket	LYAN	*Lycium andersonii*	3–15	–
	beavertail pricklypear	OPBA2	*Opuntia basilaris*	3–15	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	3–15	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	3–15	–
	Mojave yucca	YUSC2	*Yucca schidigera*	3–15	–

Animal community

Livestock Interpretations:
This site is suitable for livestock grazing. Big galleta is considered a valuable forage plant for cattle and domestic sheep. Its coarse, rigid culms make it relatively resistant to heavy grazing and trampling. Bush muhly is readily eaten by livestock throughout the year when available; however, it is usually not abundant enough to provide much forage. It is grazed heavily in winter when other species become scarce. Because of its branching habit, it is extremely susceptible to heavy grazing. Bush muhly is damaged when continuously grazed to a stubble height of less than 4 inches (10 cm). White bursage is of intermediate forage value. It is fair to good forage for horses and fair to poor for cattle and sheep. However, because there is often little other forage where white bursage grows, it is often highly valuable to browsing animals and is sensitive to browsing. Cattle will graze the stems of spiny menodora in the spring before the stems become woody and spiny. Spiny menodora has lower palatability than the other shrubs but is consumed during early spring before spines mature. Creosotebush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep.

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:
White bursage is an important browse species for wildlife. Elk will graze the stems of spiny menodora in the spring before the stems become woody and spiny. Creosotebush is unpalatable to most browsing wildlife. The palatability of bush muhly for wildlife species is rated fair to poor.

Hydrological functions

Rills and water flow patterns are none to rare. A few rills and flow patterns may be evident on steeper slopes in areas recently subject to intense summer rainfall.Sparse shrub canopy and associated litter break raindrop impact. Perennial herbaceous plants slow runoff and increase infiltration.

Other products

White bursage is a host for sandfood, a parasitic plant. Sandfood was a valuable food supply for Native Americans. Creosotebush has been highly valued for its medicinal properties by Native Americans. It has been used to treat at least 14 illnesses. Twigs and leaves may be boiled as tea, steamed, pounded into a powder, pressed into a poultice, or heated into an infusion.

Other information

Big galleta's clumped growth form stabilizes blowing sand. White bursage may be used to revegetate disturbed sites in southwestern deserts. Once established, creosotebush may improve sites for annuals that grow under its canopy by trapping fine soil, organic matter, and symbiont propagules. It may also increase water infiltration and storage.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T26S R63E S24
General legal description	Upper fan piedmonts east side of Eldorado Valley, Clark County, Nevada. This site also occurs in southern Lincoln Counties.

Other references

Brown, D.E. and R.A. Minnich. 1986. Fire and changes in creosotebush Scrub of the western Sonoran Desert, California. American Midland Naturalist. 116.2: 411-422.

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Hamerlynck, E.P., J.R. McAuliffe, E.V. McDonald and S.D. Smith. 2002. Ecological Responses of Two Mojave Desert Shrubs to Soils Horizon Development and Soil Water Dynamics. Ecology. 83.3: 768-779.

McAuliffe, J.R., E.P. Hamerlynck, and M.C. Eppes. 2007. Landscape dynamics fostering the development and persistence of long-lived creosotebush (Larrea tridentata) clones in the Mojave Desert. J. of Arid Environments. 69:96-126.

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

Contributors

GKB

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)	E.V. Hourihan
Contact for lead author	State Rangeland Management Specialist
Date	10/06/2011
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 and may be evident on steep slopes in areas recently subject to intense summer rainfall.

2. **Presence of water flow patterns:** Waterflow patterns none to rare and may be evident in areas recently subject to intense summer rainfall.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare with occurrence typically limited to areas within waterflow patterns.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground up to 45%

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 (<10 ft) during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.

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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):** Soil stability values should be 1 to 4 in the interspaces and 3 to 6 under shrub canopy. (To be field tested.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically strong medium to very thick platy. Soil surface colors are light yellowish brown or pale brown and soils are typified by an ochric epipedon, and a calcic and petrocalcic horizon. Organic matter is less than 1%.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Sparse shrub canopy and associated litter break raindrop impact. Perennial herbaceous plants slow runoff and increase infiltration.

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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):** None. Subsoil duripans or petrocalcic horizons are not to be interpreted as compacted layers.

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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: deciduous shrubs > evergreen shrubs

    Sub-dominant: deep-rooted, warm-season, perennial bunchgrasses > perennial forbs > deep-rooted, cool-season, perennial bunchgrasses > annual forbs > shallow-rooted grasses

    Other: succulents, annual grasses

    Additional:

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 35% of total woody canopy; mature bunchgrasses commonly (±25%) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Under shrubs and between plant interspaces 10-15% and depth (±¼-inch)

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season ±250lbs/ac. Favorable years400 lbs/ac and unfavorable years 150 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 red brome, filaree, annual mustards, and Mediterranean grass.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average and above average growing season years. Little growth or reproduction occurs in drought years.