USDA Natural Resources
Conservation Service

# Ecological site R030XC007NV
# SHALLOW GRAVELLY LOAM 7-9 P.Z.

Last updated: 3/10/2025
Accessed: 07/11/2025

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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): 030X–Mojave Basin and Range

MLRA Description:

Major Land Resource Area (MLRA) 30, Mojave Desert, is found in southern California, southern Nevada, the extreme southwest corner of Utah and northwestern Arizona within the Basin and Range Province of the Intermontane Plateaus. Elevations within the MLRA range from basin floors below sea level to mountains over 12,000 feet (3650 meters) high. The climate of the area is hot and dry with mostly hyperthermic and thermic soil temperature regimes and aridic soil moisture regimes. However, at higher elevations of this MLRA, generally above 5,000 feet, soil temperature regimes can be mesic, cryic and frigid with xeric soil moisture regimes. Due to the extreme elevational range found within this MLRA, land resource units (LRUs) were designated to group the MLRA into similar land units.

LRU Description:

The Bi-Modal Semi-Arid (XC) Land Resource Unit (LRU), represents a semi-arid zone as defined by the United Nations Food and Agriculture Organization and is a semi-arid region distinguished by other semi-arid regions of the Mojave by the amounts of summer precipitation it receives. Semi-arid regions in the western Mojave can experience hot and very dry summers whereas regions within the XC LRU can receive more than 2.5 inches (63.5 mm) of rain during the months of July, August and September. The Bi-Modal Semi-Arid LRU is found primarily in eastern Mojave such as in Nevada at the higher elevations, in California in the New York, Providence, Castle and Clark Mountain Ranges as well as the Cerbat and Virgin Mountains of Arizona. Elevations range from approximately 4000 to

12,000 feet (1500 to 3650 meters) and precipitation ranges 8 to 18 inches (200 – 450 mm) per year in the form of rain. Snow is not uncommon in this LRU with the chance of receiving 3 to 48 inches of snow per year.

Due to the relatively high volume of summer rainfall, soil moisture regimes may have been designated as ustic-aridic, however emerging soil moisture data suggests the xeric-aridic soil moisture regime may be more appropriate and is likely to dominate this LRU. Soils within this LRU also have a cool thermic or cooler soil temperature regime. The combination of cooler temperatures [mean annual air temperatures lower than 62 degrees F (17 degrees C)] with summer monsoonal rains help to create a unique climate within the Mojave Desert which may be more similar to the Southern Nevada Basin and Range (MLRA). Vegetation at the lower elevations of this LRU includes blackbrush, Joshua tree, juniper, pinyon pine, and mountain big sagebrush. At the higher elevations, vegetation includes oaks, Mojave sagebrush, Ponderosa pine, white fir, limber pine and the Great Basin bristlecone pine.

## Ecological site concept

This site occurs on fan remnants and ballenas in the upper fan piedmont, generally above 4000 feet with fan apexes well above 4000 feet. The soils are shallow to a duripan, petrocalcic or lithic contact and composed of alluvium predominantly from limestone or basic basalt sources. Soils have a xeric-aridic moisture regime (sometimes designated as ustic-aridic) and a cool thermic soil temperature regime where the mean annual air temperature is less than 62.5 degrees F (17 C). The representative plant community is dominated by blackbruch (Coleogyne ramosissima) with Stansbury cliffrose (Purshia stansburiana) as an emergent canopy species.

This site is part of group concept R030XC034NV.

## Associated sites

| | |
|---|---|
| R030XC011NV | **GRAVELLY INSET FAN 7-9 P.Z.** |
| R030XC018NV | **SHALLOW GRAVELLY SLOPE 11-13 P.Z.** |
| R030XC024NV | **GRAVELLY FAN 9-11 P.Z.** |

## Similar sites

| | |
|---|---|
| R030XC018NV | **SHALLOW GRAVELLY SLOPE 11-13 P.Z.**<br>Higher elevation, more ustic plant species with 5-10 percent pinyon trees. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Coleogyne ramosissima* |

| | |
|---|---|
| Herbaceous | (1) *Achnatherum speciosum* |

## Physiographic features

This site occurs on fan remnants, ballenas and lower mountain and hill sideslopes on all exposures. Slopes range from 2 to 30 percent, but slope gradients of 4 to 15 percent are typical. Elevations are 4500 to 8725 feet.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Fan remnant<br>(2) Ballena<br>(3) Mountain slope |
| Elevation | 4,500–8,725 ft |
| Slope | 2–30% |
| Aspect | Aspect is not a significant factor |

## Climatic features

The primary air masses affecting the Spring Mountains are cold maritime polar air from the Gulf of Alaska and warmer, moist maritime subtropical air from lower latitudes. Occasionally there are invasions of cold continental polar air from northern Canada or the Rocky Mountains. Precipitation in the area results primarily from the passage of cyclones with associated fronts during fall, winter and spring; from closed cyclones in late winter and spring; and from the flow of moist tropical air from the southeast to the southwest quadrant in the summer.
The mean annual precipitation is about 7 to 9 inches and mean annual air temperature is 51 to 56 degrees F., and the frost-free season is 130 to 180 days.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (average) | 180 days |
| Freeze-free period (average) | |
| Precipitation total (average) | 9 in |

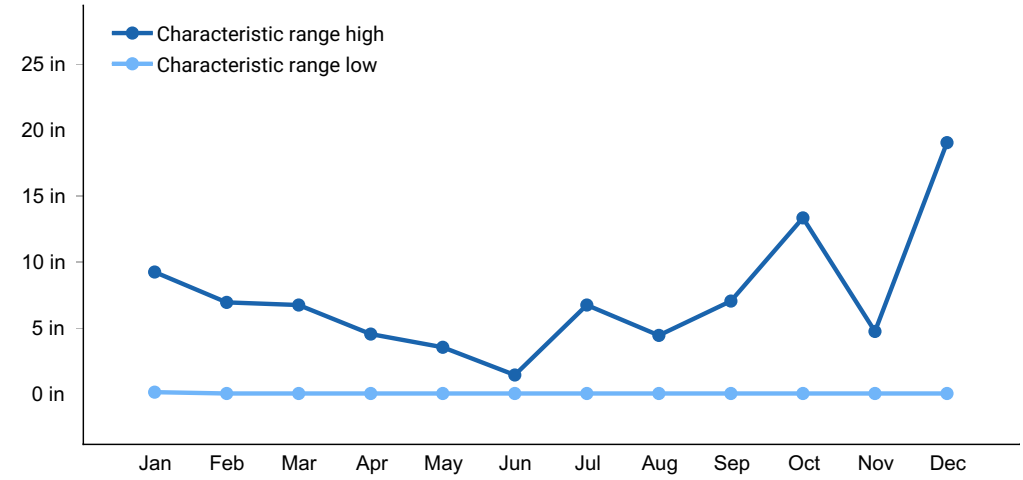



**Figure 1. Monthly precipitation range**

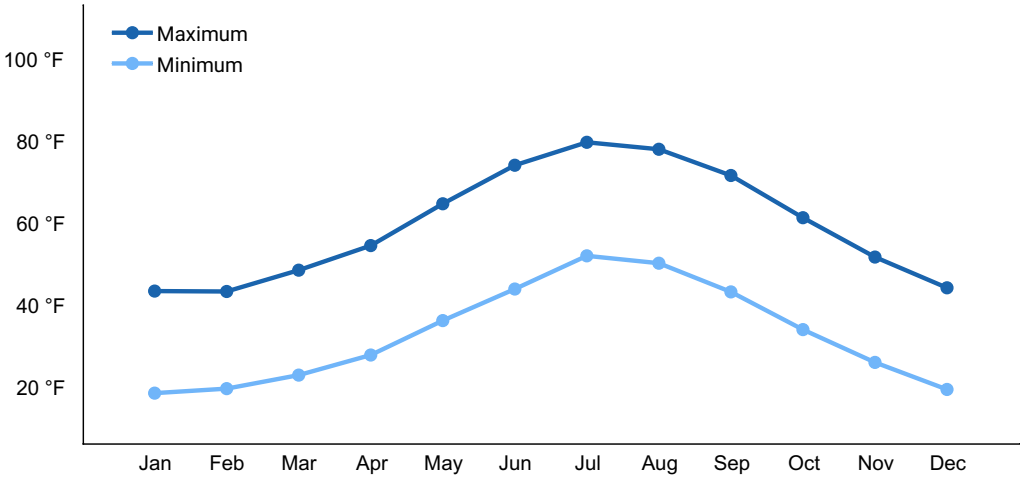



**Figure 2. Monthly average minimum and maximum temperature**

## Influencing water features

There are no influencing water features associated with this site.

## Soil features

The soils of this site are shallow to a duripan or petrocalcic horizon. They are formed in alluvium from limestone and are well drained. Surface soils are medium to coarse textured. Subsoils are generally medium textured with a high percent of gravels. Runoff is high to very high and the potential for gully, sheet or rill erosion varies with slope. Water holding capacity is very low. The soils are dry most of the year but are moist for short periods during the winter and early spring months and occasionally for short intermittent periods following summer convection storms. Soils have an typic-aridic moisture regime. Soil series associated with this site include Boxspring, Diamondhil, Moentria, and Purob.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium–limestone |

| | |
|---|---|
| Surface texture | (1) Very gravelly loam<br>(2) Extremely gravelly loam |
| Family particle size | (1) Loamy |
| Drainage class | Well drained |
| Permeability class | Moderate to moderately rapid |
| Soil depth | 10–20 in |
| Surface fragment cover <=3" | 35–70% |
| Surface fragment cover >3" | 3–20% |
| Available water capacity (0-40in) | 0.4–1.44 in |
| Calcium carbonate equivalent (0-40in) | 30–80% |
| Electrical conductivity (0-40in) | 0–12 mmhos/cm |
| Sodium adsorption ratio (0-40in) | 0–4 |
| Soil reaction (1:1 water) (0-40in) | 7.4–9 |
| Subsurface fragment volume <=3" (Depth not specified) | 20–55% |
| Subsurface fragment volume >3" (Depth not specified) | 0–7% |

## Ecological dynamics

Blackbrush communities are most prevalent in the transitional zone between the Mojave Desert and Great Basin and are commonly associated with creosotebush. Blackbrush is a paleoendemic species as originally postulated by Stebbins and Major (1965). Blackbrush is a transitional species that occupies a boundary that has shifted in recent geologic time. Analysis of packrat middens suggests a 50–100m downward movement of the blackbrush zone along elevational gradients in the Mojave (Cole and Webb, 1985; Hunter and McAuliffe, 1994).

Blackbrush is a long-lived and generally considered a climax species. It is a non-sprouter; regeneration depends on wind pollinated seed and heavy winter precipitation, and is therefore slow to re-colonize burned areas (Anderson 2001). Blackbrush recruitment is episodic, like many shrubs in arid systems, when conditions are favorable large seed crops are produced and the rest of the time is characterized by minimal seed output (Pendleton and Meyer 2004). Blackbrush seeds are frequently cached away by rodents, until conditions are conducive for germination. Typically, germination occurs during the

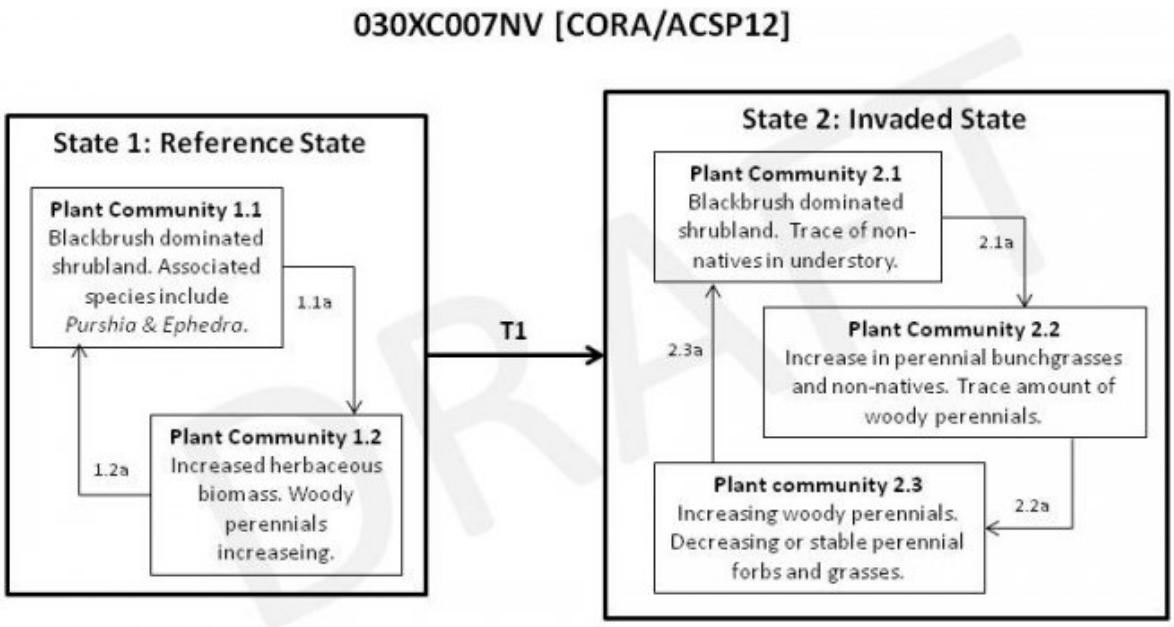
winter and early spring, given the proper moisture conditions and cool soil temperatures (Pendleton 2008). Seeds require cold stratification before germination and the survival of seedlings following germination is dependent on the availability of spring time moisture (Pendleton 2008).

On undisturbed sites, blackbrush dominates the landscape and species diversity is generally low. Undisturbed blackbrush communities are fairly resistant to invasion by non-natives (Brooks and Matchett 2003). Mature blackbrush plants are well adapted to persist under less than optimal conditions, and individuals' may live as long as 400 years (Pendleton and Meyer 2004).

Fire Ecology:
Blackbrush communities are considered to be one of the most flammable native plant assemblages in the Mojave Desert. Fire will start and spread easily due to closing spacing nature and resinous foliage of blackbrush. The short-lived seed of blackbrush is readily destroyed by fire and it may take upwards of 60 years for blackbrush to reestablish. There is frequently 100 percent mortality of mature blackbrush following fire (Brooks and Matchett 2003). Fire effects on Stansbury cliffrose are variable. It is described as a weak sprouter that is killed by severe fire. Nevada ephedra and Mormon tea respond similarily to fire. They are generally top-killed by fire, but underground regenerative structures commonly survive. Ephedra generally sprouts after fire damages aboveground vegetation and may increase in plant cover. Desert needlegrass has persistent dead leaf bases, which make it susceptible to burning. Fire removes the accumulation; a rapid, cool fire will not burn deep into the root crown (Pavek 1993). Most perennial grasses have root crowns that can survive wildfire.

Post-fire plant communities vary, depending on use history and species present prior to the fire. Post fire sprouting shrub species such as yucca, Stansbury cliffrose and ephedra increase along with perennial grasses. Species that readily reestablish from seed such also increase. Generally, non-natives increase and native species decrease post fire (Brooks and Matchett 2003). The effects of fire on blackbrush appear to be long term.

## State and transition model




## State 1
## Reference State

The reference state is representative of the natural range of variability under pristine conditions and is dominated by a blackbrush shrubland, important associated species include Purshia and Ephedra. Plant community phase changes are primarily driven by fire, long-term drought and insect attack. Timing of disturbances in combination with weather events determines plant community dynamics. Historically, fire was rare in this system but did have long-term impacts on the plant community.

## Community 1.1
## Reference Plant Community

The reference plant community is dominated by blackbrush. Stansbury's cliffrose, ephedra, Joshua tree, and desert needlegrass are important species associated with this site. Potential vegetative composition is about 15 percent grasses, 10 percent forbs, and 75 percent shrubs and trees. Approximate ground cover (basal and crown) is about 25 to 35 percent. Total annual air-dry production is 500 pounds favorable years, 350 pounds normal years, and 200 pounds on unfavorable years.

**Table 5. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Shrub/Vine | 150 | 262 | 375 |
| Grass/Grasslike | 30 | 53 | 75 |
| Forb | 20 | 35 | 50 |
| **Total** | **200** | **350** | **500** |

**Table 6. Ground cover**

| | |
|---|---|
| Tree foliar cover | 0-1% |
| Shrub/vine/liana foliar cover | 15-25% |
| Grass/grasslike foliar cover | 5-10% |
| Forb foliar cover | 1-5% |
| Non-vascular plants | 0% |
| Biological crusts | 1-3% |
| Litter | 5-30% |
| Surface fragments >0.25" and <=3" | 35-70% |
| Surface fragments >3" | 3-20% |
| Bedrock | 0% |
| Water | 0% |
| Bare ground | 5-20% |

**Table 7. Canopy structure (% cover)**

| Height Above Ground (Ft) | Tree | Shrub/Vine | Grass/ Grasslike | Forb |
|---|---|---|---|---|
| <0.5 | 1-3% | 1-5% | 1-5% | 1-5% |
| >0.5 <= 1 | 1-3% | 5-10% | 5-10% | 1-5% |
| >1 <= 2 | 1-3% | 10-25% | – | – |
| >2 <= 4.5 | 1-3% | 1-5% | – | – |
| >4.5 <= 13 | 1-3% | – | – | – |
| >13 <= 40 | – | – | – | – |
| >40 <= 80 | – | – | – | – |
| >80 <= 120 | – | – | – | – |
| >120 | – | – | – | – |

### Community 1.2
### Plant Community 1.2

This plant community is characteristic of an early-seral, post disturbance plant community and is initially heavily dominated by herbaceous biomass. Sprouting shrubs quickly recover and provide favorable environment for the establishment of other shrub seedlings. Fast moving, low intensity fires result in the incomplete removal of blackbrush allowing for direct reestablishment. This plant community is at-risk of invasion by non-native annuals. A biotic threshold is crossed with the introduction of non-natives that are difficult to remove from the system and have the potential to significantly alter disturbance regimes from their historic range of variation. Composition of post-fire plant communities may vary depending on season of burn.

### Pathway 1.1a
### Community 1.1 to 1.2

Wildfire, prolonged drought and/or insect/disease attack.

### Pathway 1.2a
### Community 1.2 to 1.1

Absence from disturbance and natural regeneration over time. Regeneration of blackbrush is dependent on near by seed source and favorable climatic conditions. Recovery of blackbrush to pre-fire conditions may take greater than 60 years.

## State 2
## Invaded State

The invaded state is characterized by a blackbrush dominated community with non-native annuals in the understory. A biotic threshold has been crossed by the introduction of non-natives that cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation. Ecological processes have not been compromised at this time, however the presence of non-natives has reduced the ecological resilience. Introduced annuals such as red brome and cheatgrass have invaded the reference plant community. These non-natives are highly flammable and promote wildfires where wildfires historically have been infrequent.

### Community 2.1
### Community 2.1

This plant community is characterized by the presence of non-native species in the understory. Following a disturbance this plant community relies on the availability of a nearby seed source. Recovery of blackbrush to pre-fire conditions can take greater than 60 years. It is also possible that very old stands of blackbrush established hundreds to

thousands of years ago and may not be able to recover under the current climatic conditions.

### Community 2.2
### Community 2.2

This plant community is characterized by decreased native woody perennials and increased annual grasses and forbs, as well as, increased perennial grasses and forbs. Non-native plant cover increases post disturbance, species include annual grasses and forbs. This plants community is identified as ‘at-risk’. Continued heavy disturbance or repeated fire will exclude native woody vegetation and change the ecological dynamics, causing the site to cross a biotic threshold. Management should focus on reducing surface disturbances and protecting remaining native vegetation to ensure seed is available for future regeneration.

### Community 2.3
### Community 2.3

This plant community is characterized by recovering native woody perennials. Sprouting species such as Ephedra and Purshia will be the first shrubs to appear post-fire. Non-natives are present in the understory. Recovery of blackbrush is highly dependent on intensity of the fire. Fast moving, low intensity fires result in incomplete removal of blackbrush, which allows for direct reestablishment. Abundance of non-native biomass varies annually depending on weather; droughty conditions favor native perennials and decrease abundance of non-natives. Blackbrush will begin to reestablish provided favorable climatic conditions and available seed source.

### Pathway 2.1a
### Community 2.1 to 2.2

Surface disturbance or fire removes mature shrubs and favors an increase of herbaceous vegetation, native and non-native.

### Pathway 2.2a
### Community 2.2 to 2.3

Changes in management remove disturbance and allow native woody perennials to regenerate.

### Pathway 2.3a
### Community 2.3 to 2.1

Recovery of perennial native plant community. Sufficient time for blackbrush to reestablish on a site can range from to 50 to 100 years, given favorable climatic conditions.

## 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 8. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Primary Perennial Grasses** | | | 17–50 | |
| | desert needlegrass | ACSP12 | *Achnatherum speciosum* | 17–50 | – |
| 2 | **Secondary Perennial Grasses** | | | 1–35 | |
| | Indian ricegrass | ACHY | *Achnatherum hymenoides* | 2–7 | – |
| | purple threeawn | ARPU9 | *Aristida purpurea* | 0–7 | – |
| | squirreltail | ELEL5 | *Elymus elymoides* | 2–7 | – |
| | woollygrass | ERION | *Erioneuron* | 2–7 | – |
| | Sandberg bluegrass | POSE | *Poa secunda* | 2–7 | – |
| | dropseed | SPORO | *Sporobolus* | 0–7 | – |
| **Forb** | | | | | |
| 3 | **Perennial Forbs** | | | 18–35 | |
| | milkvetch | ASTRA | *Astragalus* | 2–7 | – |
| | Indian paintbrush | CASTI2 | *Castilleja* | 2–7 | – |
| | desert larkspur | DEPA | *Delphinium parishii* | 2–7 | – |
| | phacelia | PHACE | *Phacelia* | 2–7 | – |
| | desert globemallow | SPAM2 | *Sphaeralcea ambigua* | 2–7 | – |
| | foothill deathcamas | ZIPA2 | *Zigadenus paniculatus* | 2–7 | – |
| 4 | **Annual Forbs** | | | 1–3 | |
| | cryptantha | CRYPT | *Cryptantha* | 1–3 | – |
| **Shrub/Vine** | | | | | |
| 5 | **Primary Shrubs** | | | 224–290 | |
| | blackbrush | CORA | *Coleogyne ramosissima* | 210–245 | – |

| | | | | | |
|---|---|---|---|---|---|
| | Stansbury cliffrose | PUST | *Purshia stansburiana* | 7–28 | – |
| | Nevada jointfir | EPNE | *Ephedra nevadensis* | 7–17 | – |
| 6 | **Secondary Shrubs** | | | 18–53 | |
| | mountain big sagebrush | ARTRV | *Artemisia tridentata ssp. vaseyana* | 0–11 | – |
| | fourwing saltbush | ATCA2 | *Atriplex canescens* | 4–11 | – |
| | winterfat | KRLA2 | *Krascheninnikovia lanata* | 4–11 | – |
| | spiny menodora | MESP2 | *Menodora spinescens* | 4–11 | – |
| | desert almond | PRFA | *Prunus fasciculata* | 4–11 | – |
| | shortspine horsebrush | TESP2 | *Tetradymia spinosa* | 4–11 | – |
| | banana yucca | YUBA | *Yucca baccata* | 4–11 | – |
| | Joshua tree | YUBR | *Yucca brevifolia* | 4–11 | – |
| | mormon tea | EPVI | *Ephedra viridis* | 4–11 | – |
| | Apache plume | FAPA | *Fallugia paradoxa* | 0–4 | – |
| | Engelmann's hedgehog cactus | ECEN | *Echinocereus engelmannii* | 0–4 | – |
| **Tree** | | | | | |
| 7 | **Trees** | | | 4–11 | |
| | Utah juniper | JUOS | *Juniperus osteosperma* | 4–11 | – |

## Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the low forage production. Grazing management should be keyed to perennial grasses and palatable shrub production. Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately grazed by horses and cattle, but rarely grazed by sheep. Blackbrush is not preferred as forage by domestic livestock, but does provide some forage during the spring, summer and fall. Stansbury cliffrose is an important browse species for livestock, especially in the winter. Fourwing saltbush is one of the most palatable shrubs in the West. Its protein, fat, and carbohydrate levels are comparable to alfalfa. It provides nutritious forage for all classes of livestock. Palatability is rated as good for domestic sheep and domestic goats; fair for cattle; fair to good for horses in winter, poor for horses in other seasons. Nevada ephedra is important winter range browse for domestic cattle, sheep and goats. Green ephedra is heavily browsed by livestock on winter range but only moderately or lightly browsed during other seasons.
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:
Young desert needlegrass is palatable to many species of wildlife. Desert needlegrass produces considerable basal foliage and is good forage while young. Desert bighorn sheep graze desert needlegrass. Blackbrush is a valuable browse species for bighorn sheep. It may also comprise up to 25% of the mule deer winter diet. Blackbrush provides cover for upland game birds, nongame birds and small mammals. Stansbury cliffrose is an important browse species for mule deer, pronghorn, game birds, and songbirds. Wild ungulates use it heavily in winter. Fourwing saltbush provides valuable habitat and year-round browse for wildlife. Fourwing saltbush also provides browse and shelter for small mammals. Additionally, the browse provides a source of water for black-tailed jackrabbits in arid environments. Granivorous birds consume the fruits. Wild ungulates, rodent and lagomorphs readily consume all aboveground portions of the plant. Palatability is rated good for deer, elk, pronghorn and bighorn sheep. Mule deer, bighorn sheep, and pronghorn browse Nevada ephedra, especially in spring and late summer when new growth is available. Green ephedra is an important browse species for big game animals. Green ephedra is heavily used by wildlife on winter ranges.

## Hydrological functions

A few rills can occur on this site, especially on steeper slopes, following summer convective storms.
Water flow patterns are found in interspaces between shrubs, not connected. Should be limited except following intense summer storms. Hydrologic soil groups are B, C and D. Pedestals and/or Terracettes – Few to none.

## 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 information

Blackbrush contributes to desert fertility by 1) protecting the soil against wind erosion through retarding the movement of soil and increasing the accumulation of fine soil particles around its base; 2) protecting understory vegetation from the effects of high temperatures, thereby helping to retain surface nitrogen and adding organic matter to the soil; and 3) serving as a nitrogen reservoir through the storage of nitrogen in roots, leaves, and stems.
Desert needlegrass seeds are easily germinated and have potential for commercial use. Desert needlegrass may be used for groundcover in areas of light disturbance, but it is

susceptible to excessive trampling.

There is one known plant species of concern found in this ecological site in the Spring Mountain National Recreation Area (SMNRA).

## Type locality

| Location 1: Clark County, NV | |
|---|---|
| Township/Range/Section | T19 S. R58 E. S29 SW |
| Latitude | 36° 16′ 18″ |
| Longitude | 115° 30′ 20″ |
| General legal description | Approximately 0.5 miles south of State Route 157 and 0.25 miles east of the Toiyabe National Forest boundary in Kyle Canyon, Clark County, Nevada. |

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## Contributors

TJ Wolfe
TJ WOLFE

## 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) | TJ Wolfe |
| Contact for lead author | State Rangeland Management Specialist |
| Date | 09/01/2004 |
| Approved by | Kendra Moseley |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:** Rills are none to rare. A few rills (<1/10 m or 30 ft) will occur, especially following summer convective storms due to very shallow skeletal soils and steep

slopes.

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2. **Presence of water flow patterns:** A few (<1/10 m or 30 ft) water flow patterns may occur in interspaces between shrubs, rarely connected. These should be limited to times following intense summer storms on steeper slopes or to natural drainages within the ecological site.

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3. **Number and height of erosional pedestals or terracettes:** Few to none. Should only occu when associated with rills or water flow patterns on steeper slopes or natural drainages. Height < 0.5 inch.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground 5-20%. Soil is mostly covered by gravels, vegetation and some lichens/mosses. When patches of bare ground (3 ft. diameter) occur, they should be associated with rodent burrow activity.

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

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

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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 intense summer storms.

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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 are typically 1 to 3 in the interspaces and 4 to 6 under canopy.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color**

**and thickness):** A-horizon thickness can range from 0-3 inches. Surface structure is typically moderate thin to medium platy. Soil surface colors are very pale brown to brown and soils are typified by an ochric epipedon. Organic matter of the surface horizon is typically less than 1 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Soils have moderate permeability. Deep-rooted bunchgrasses and shrub canopy break raindrop impact, slow runoff and increase infiltration. Shrub canopy and standing dead grasses provide some opportunity for snow catch on this site.

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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):** Compacted layers are none. Subsoil calcic and petrocalcic horizons are not to be interpreted as compacted.

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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: non-sprouting evergreen shrubs

    Sub-dominant: deep-rooted, cool-season, perennial bunchgrasses = deciduous shrubs > shallow-rooted cool-season perennial bunchgrasses > deep-rooted, cool-season perennial forbs <> annual forbs <> succulents

    Other: warm-season, perennial grasses, biological soil crust

    Additional:

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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 30% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers, especially with multi-year droughts.

14. **Average percent litter cover (%) and depth ( in):** Litter cover is high under shrubs and grasses and is between 5-15% in plant interspaces. Litter depth, where it occurs, is 0.25 inches.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through mid-June) is ± 350 lbs/ac, ranging from 200 in poor growth years to 500 lbs/ac in optimal growth years.

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:** Red brome and cheatgrass invade and persist on this site. Utah juniper will increase.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years. Less reproduction, although, rarely none, will occur in below-average precipitation years.