USDA Natural Resources Conservation Service

Ecological site R030XA020CA
Arid Fans 5-7

Last updated: 10/21/2024
Accessed: 11/22/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 030X–Mojave Basin and Range

The Mojave Desert Major Land Resource Area (MLRA 30) 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. The Mojave Desert is a transitional area between hot deserts and cold deserts where close proximity of these desert types exert enough influence on each other to distinguish these desert types from the hot and cold deserts beyond the Mojave. Kottek et. al 2006 defines hot deserts as areas where mean annual air temperatures are above 64 F (18 C) and cold deserts as areas where mean annual air temperatures are below 64 F (18 C). Steep elevation gradients within the Mojave create islands of low elevation hot desert areas surrounded by islands of high elevation cold desert areas.

The Mojave Desert receives less than 10 inches of mean annual precipitation. Mojave Desert low elevation areas are often hyper-arid while high elevation cold deserts are often semi-arid with the majority of the Mojave being an arid climate. Hyper-arid areas receive less than 4 inches of mean annual precipitation and semi-arid areas receive more than 8 inches of precipitation (Salem 1989). The western Mojave receives very little precipitation during the summer months while the eastern Mojave experiences some summer monsoonal activity.

In summary, the Mojave is a land of extremes. Elevation gradients contribute to extremely hot and dry summers and cold moist winters where temperature highs and lows can fluctuate greatly between day and night, from day to day and from winter to summer. Precipitation falls more consistently at higher elevations while lower elevations can experience long intervals without any precipitation. Lower elevations also experience a low frequency of precipitation events so that the majority of annual precipitation may come in only a couple precipitation events during the whole year. Hot desert areas influence cold desert areas by increasing the extreme highs and shortening the length of below freezing events. Cold desert areas influence hot desert areas by increasing the extreme lows and increasing the length of below freezing events. Average precipitation and temperature values contribute little understanding to the extremes which govern wildland plant communities across the Mojave.

Arid Western Mojave Land Resource Unit (XA)

LRU notes

The Mojave Desert is currently divided into 4 Land Resource Units (LRUs). This ecological site is within the arid portions of the Mojave where precipitation primarily occurs during the winter months (Hereford et. al 2004). The lack of summer precipitation as well as cooler temperatures allows cool season species to occupy sites at lower elevations than they do in the Eastern Mojave. For example, sandberg bluegrass, winterfat and spiny hopsage are common at lower elevations in the Western Mojave than they are in the Eastern Mojave. Warm season species like big galleta rarely occur in the Western Mojave. The Arid Western Mojave LRU is designated by the 'XA' symbol within the ecological site ID and is roughly equivalent to Western Mojave Basins and Western Mojave Low Ranges and Arid Footslopes of EPA Level IV Ecoregions.

Elevations range from 1650 to 4300 feet and precipitation is between 4 to 8 inches per year. The Arid Western Mojave LRU is distinguished from the Arid Eastern Mojave (XB) by the lack of summer precipitation which excludes many warm season plant species from occurring in this LRU. Vegetation includes creosote bush, rabbitbrush, shadscale saltbush, spiny hopsage, winterfat, Nevada jointfir, and Joshua tree. At the upper elevations of the LRU, plant production and diversity are greater and blackbrush is a common dominant shrub. The Arid Western Mojave LRU generally lacks the diversity of yucca, cacti and warm season species found in the Arid Eastern Mojave.

Classification relationships

NDDB/Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California - Mojave Creosote Bush. Sawyer, J.O. and T. Keeler-Wolf. 1995. Manual of California Vegetation - Creosote bush-White bursage series.

Ecological site concept

The Arid Fans ecological site is on active alluvial fans within the fan piedmont below 3000 feet (915 m) elevation. Soils are very deep and formed in alluvium from granodiorite. Although this ecological site is not on steep landforms with slopes generally less than 10% slope, coarse-loamy particle size and sandy soils create conditions for well drained to somewhat excessively well drained soils.

The central concept for the ecological site is within the Soil Survey of Kern County, California, Southeastern Part (SSA CA670) and on the Cajon 85 % component within the Cajon loamy sand, 0 to 5 percent slopes map unit.

This is a group concept and provisional STM that also covers these following ecological sites: R030XA017CA, R030XA176CA, R030XF003CA, R030XF012CA, R030XG022CA, R030XG023CA

Associated sites

R030XA021CA	**Limy Sand 5-7** Limy Sand 5-7
R030XA029CA	**Shallow Limy 5-7** Shallow Limy 5-7

Similar sites

R030XA058NV	**LIMY 5-7 P.Z.** Limy 5-8
R030XA029CA	**Shallow Limy 5-7** Shallow Limy 5-7
R030XA021CA	**Limy Sand 5-7** Limy Sand 5-7
R030XB005NV	**Arid Active Alluvial Fans** White bursage dominant shrub; big galleta dominant grass
R030XA017CA	**Droughty Loam 5-7" P.Z.** Essentially the same ecological site concept as R030XA020CA. R030XA017CA is a community phase within R030XA020CA.
R030XA020CA	**Arid Fans 5-7** Essentially the same ecological site concept as R030XF003CA. R030XF003CA is a community phase within R030XA020CA.
R030XA020CA	**Arid Fans 5-7** Essentially the same ecological site concept as R030XF012CA. R030XF012CA is a community phase within R030XA020CA.
R030XA020CA	**Arid Fans 5-7** Essentially the same ecological site concept as R030XG022CA. R030XG022CA is a community phase within R030XA020CA.

R030XA020CA	**Arid Fans 5-7** Essentially the same ecological site concept as R030XG023CA. R030XG023CA is a community phase within R030XA020CA.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ambrosia dumosa* (2) *Larrea tridentata*
Herbaceous	(1) *Achnatherum speciosum*

Physiographic features

This site occurs on fan piedmonts, hills and rock pediments on all exposures. Elevations are 2300 to 3300 feet. Slopes range from 2 to 50 percent, but slope gradients from 2 to 9 are most typical.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Fan piedmont (3) Fan apron
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to rare
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	None to rare
Elevation	640–1,036 m
Slope	2–30%
Ponding depth	0–3 cm
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate on this site is characterized by cool, relatively dry winters (30 to 60 degrees F) and hot, dry summers (70 to 100 degrees F). The average annual precipitation ranges from 3 to 7 inches with most falling as rain from November to March. Mean annual air temperature is 60 to 64 degrees F.

The average frost free period is 200 to 250 days.

Table 3. Representative climatic features

Frost-free period (average)	250 days
Freeze-free period (average)	365 days
Precipitation total (average)	178 mm

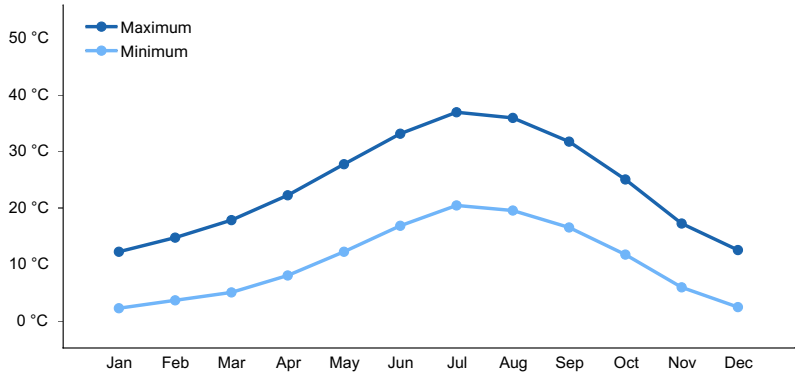

Figure 1. Monthly average minimum and maximum temperature

Influencing water features

The plant community for this site is not influenced by water from a wetland or stream.

Soil features

The soils that characterize this site are well drained and moderately deep to very deep. They are formed in limy granitic alluvium. Surface textures are loamy sands and sandy loams. Subsoils are loamy sands, sandy loams and sandy clay loams. These soils are slightly to moderately alkaline. Available water capacity is very low to moderate and the hazard of water erosion is slight to moderate. Wind erosion hazard is moderate to severe. Effective rooting depth is 20 inches or more. Water tables are greater than 60 inches.

Table 4. Representative soil features

Surface texture	(1) Loamy sand (2) Sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to very rapid
Soil depth	51–152 cm
Available water capacity (0-101.6cm)	2.54–20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%

Ecological dynamics

This creosotebush-white bursage (*Larrea tridentata-Ambrosia dumosa*) site is extensive throughout the Mojave Desert and consists of both long-lived and short-lived perennial species. In stable, old communities, creosotebushes or clones may attain ages of several thousand years. Defoliation and death of branches of creosotebush may occur as a result of long periods of intense moisture stress. Surface disturbance on this site may reduce plant cover, density and diversity and increase erosion on this site. These changes can be very subtle or extremely obvious depending on the intensity of use, rate of use and an assortment of environmental factors

(topography, rainfall, soil type).

Destructive impacts such as land clearing can reduce long-lived creosotebush. The opportunistic perennials such as rayless goldenhead (*Acamptopappus sphaerocephalus*), white burrobush (*Hymenoclea salsola*), and wire lettuce (*Stephanomeria pauciflora*) will increase. With a loss of perennial cover, non-native annual grasses and forbs such as red brome (*Bromus rubens*), schismus (*Schismus arabicus*), and redstem stork's bill (*Erodium cicutarium*) will readily invade this site.

Fire effects - Desert communities are usually unaffected by fire because of low fuel loads, although a year of exceptionally heavy winter rains can generate fuels by producing a heavy stand of annual forbs and grasses. When fires do occur, the effect on the ecosystem may be extreme due to the harsh environment and the slow rate of recovery. White bursage and creosotebush possess limited sprouting ability, thus can be killed by fire. White bursage, however, can rapidly re-establish from off-site seed. Desert needlegrass has persistent dead leaf bases, which make it susceptible to burning. A rapid, cool fire may top-kill desert needlegrass (*Achnatherum speciosum*), but may not burn into the root crown, allowing for resprouting.

State and transition model

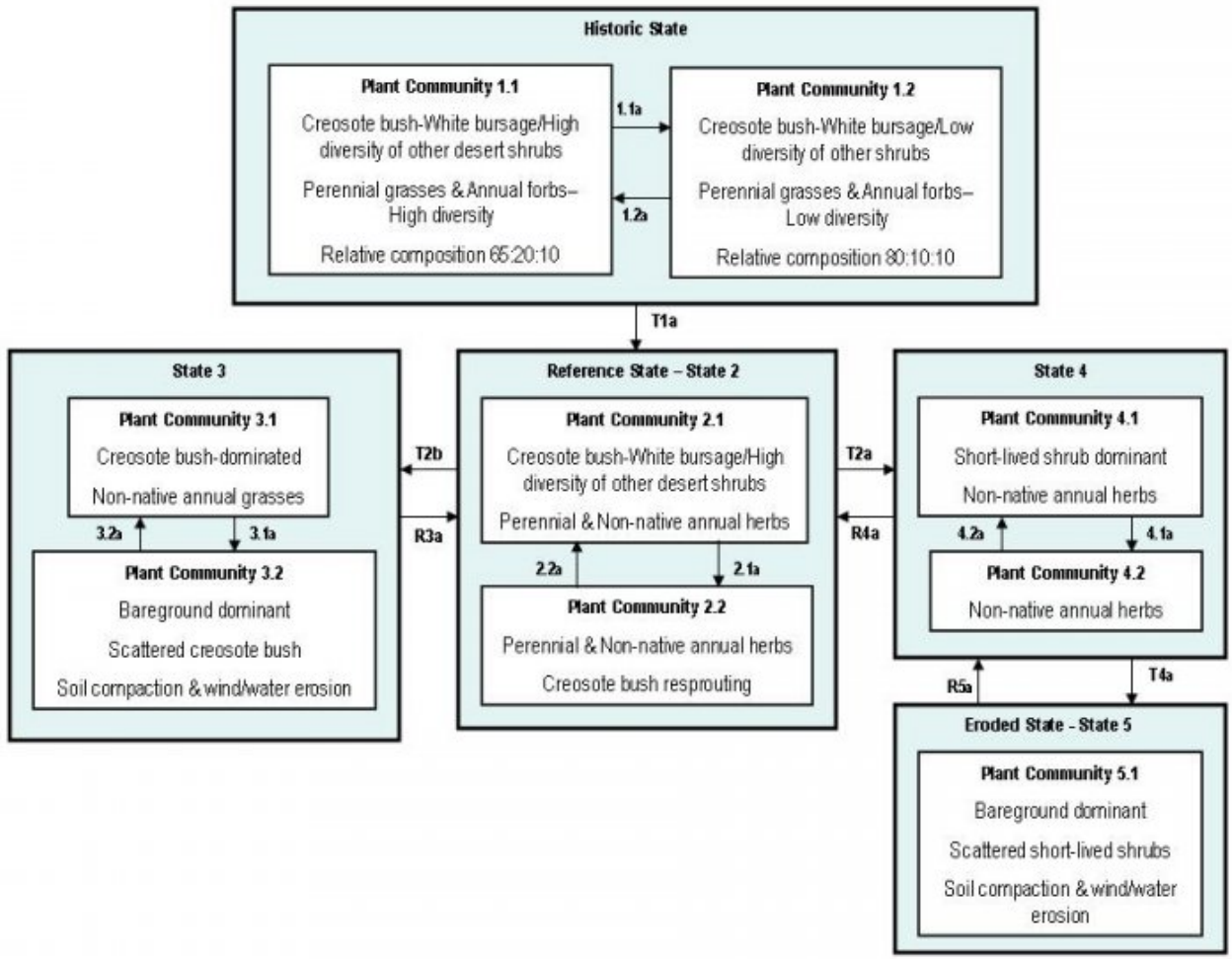

Figure 2. Limy 5-7" p.z. model

State 1
Historic State - Plant Community 1.1

Community 1.1
Historic State - Plant Community 1.1

The historic plant community is characterized by widely spaced shrubs, 0.5 to 2 meters tall. Creosotebush and

white bursage form the most characteristic association. Perennial grasses include desert needlegrass, Indian rice grass (*Achnatherum hymenoides*), and Sandberg bluegrass (*Poa secunda*). Perennial forbs include desert globemallow (*Sphaeralcea ambigua*), wishbone-bush (*Mirabilis laevis*), milkvetch (Astragalus spp.), and desert trumpet (*Eriogonum inflatum*). The majority of the annuals are winter annuals which are abundant after winters of above average precipitation. Potential vegetative composition by air-dry weight is about 20% grasses, 15% forbs, and 65% shrubs. Approximate ground cover (basal and crown) ranges from 15 to 25 percent. The dominant shrub species are white bursage, creosotebush, winterfat (*Krascheninnikovia lanata*), and spiny hopsage (*Grayia spinosa*). Other shrubs listed in Plant Community Composition are present in small amounts. Each of these species contributes up to 5% of the total site production in a normal year. As a group, these minor species contribute up to 15% of the total site production. The dominant grass species are desert needlegrass and Indian ricegrass. Other perennial grasses listed in Plant Community Composition are present in small amounts. Each of these species contributes up to 2% of the total site production in an average year. As a group, these species contribute up to 8% of the total production. As a group, annual grasses contribute up to 5% of the total production. As a group, perennial forbs contribute up to 8% of the total site production in an average year. As a group, annual forbs contribute up to 10% of the total production. Total site production and species composition may vary from year to year depending on precipitation or other climatic factors. Transitions: 1.1 to 1.2 – During drought years some of the shrub diversity may be reduced and a lot of the grasses will also be reduced. 1.2 back 1.1 – Following years of above average rainfall, the shrub diversity and grass diversity would return….also would see increased annual production of dominant shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	146	258	364
Grass/Grasslike	45	78	112
Forb	34	56	84
Total	**225**	**392**	**560**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-16%
Grass/grasslike foliar cover	3-5%
Forb foliar cover	2-4%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

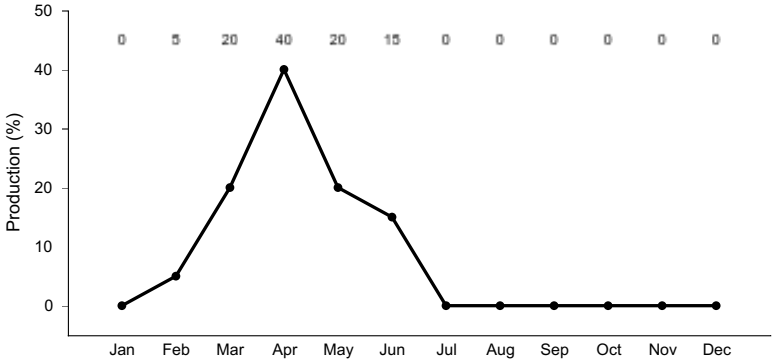

Figure 4. Plant community growth curve (percent production by month). CA3002, Creosote bush XY. Growth starts in early spring, flowering and seed set occur by July. Dormancy occurs during the hot summer months. With sufficient summer/fall precipitation, some vegetation may break dormancy and produce a flush of growth..

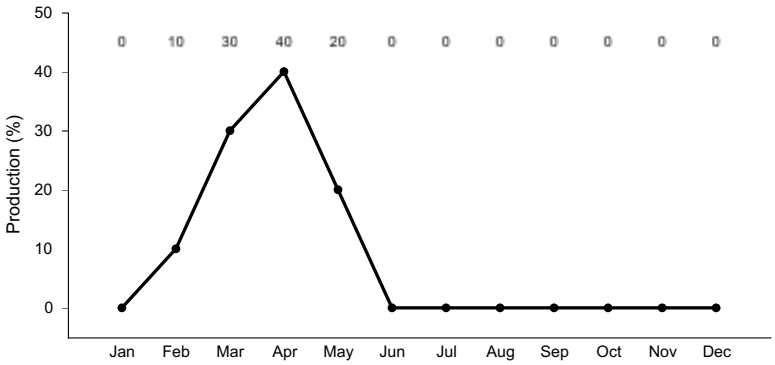

Figure 5. Plant community growth curve (percent production by month). CA3006, Spiny hopsage. Growth starts in late winter. Flowering and seed set occur by June. Seeds remain on the shrubs for several months. Dormancy occurs during the hot summer months..

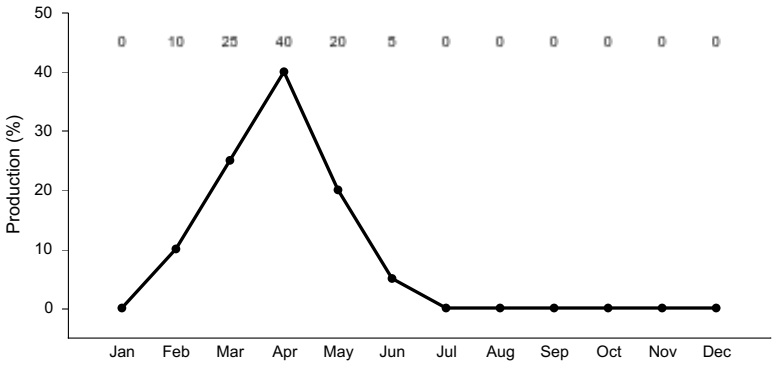

Figure 6. Plant community growth curve (percent production by month). CA3009, Winterfat. Growth starts in late winter. Flowering and seed set occur by June. Seeds remain on the shrubs for several months. Dormancy occurs during the hot summer months..

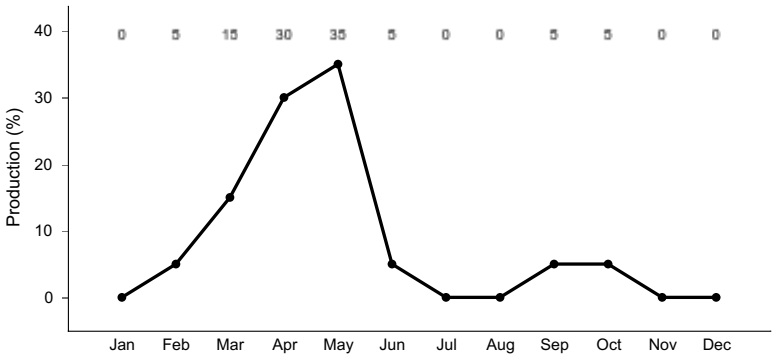

Figure 7. Plant community growth curve (percent production by month). CA3022, Indian ricegrass. Growth begins in late winter, flowering and fruiting finished by the hot summer months. Early fall rains can trigger a

flush of new growth..

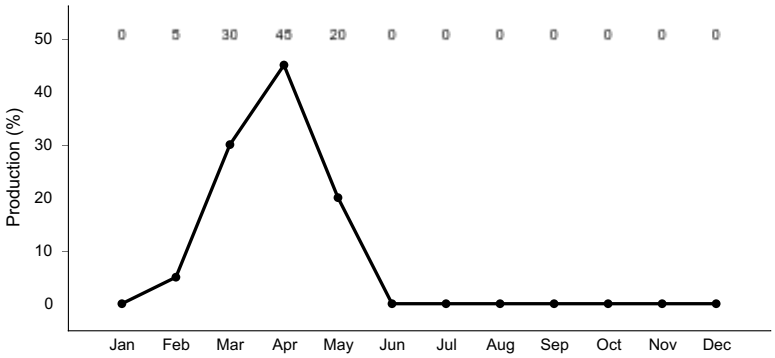

Figure 8. Plant community growth curve (percent production by month). CA3083, Burrobush XY. Growth begins in mid-winter and by late spring, seed has set..

Figure 9. Plant community growth curve (percent production by month). CA3087, Desert needlegrass. Growth begins in mid-winter and continues through summer, setting seed in late summer..

State 2
Current State 2 - Non-native annuals

Community 2.1
Current State 2 - Non-native annuals

This site occurs across the west end of the MLRA. Introduced annuals such as red brome, schismus and redstem stork's bill have invaded the historic plant community and have become a dominant component of the herbaceous cover. These annuals, however, provide valuable livestock forage during the spring months in favorable years. This invasion on non-natives is attributed to a combination of factors including: 1) surface disturbances, 2) changes in the kinds of animals and their grazing patterns, 3) drought, and 4) changes in fire history. These non-native annuals are highly flammable and promote wildfires where fires historically have been infrequent. LATR and AMDU would persist after this invasion by non-native annuals, but the other shrubs and desirable grasses would either be unsuccessful in competing with the non-natives or removed from the system. THRESHOLD that is crossed, is the introduction of non-native annuals that cannot be removed from the system and will alter disturbance regimes significantly from their natural or historic range of disturbances. 2.1 to 2.2 – Following either light fires that burn the herbaceous layer and some of the LATR and AMDU or chronic severe defoliation of mostly AMDU, the site will be more heavily dominated by non-native annuals and LATR. 2.2 back to 2.1 – AMDU will come back to this site over time.

State 3
State 3 - OHV State

Community 3.1
State 3 - OHV State

State 3 – Following repeated and/or unmanaged use by OHVs, LATR will become most dominant and possibly only

species that still exists given enough time. LATR will not likely be run over, but run around, destroying all other lower growing shrubs and grasses. There will be increased open spaces b/w shrubs, gravels will be pushed below the soil surface, in turn pushing up finer sediments that are more easily erodable, which will increase the chance of wind and water erosion. This will also be a pc that is susceptible to the invasion of exotics. 3.1 to 3.2 – Poor vigor LATR will be all that's left, with active erosion and evidence of water gullies. No other plants will likely be found on this site (this is after multiple years of repeated OHV use).

State 4
State 4 - Fire State

Community 4.1
State 4 - Fire State

State 4 – This state occurs after severe fires that happen following a couple years of good precip that increased annuals herbaceous layer. This would remove all LATR and AMDU and be replaced by a suite of fire-tolerant shrubs that would likely include Ericameria, Buckwheats, and Hymenoclea. With an annual herbaceous layer. 4.1 to 4.2 – pushed by unmanaged OHV use to mostly bareground, active erosion and scattered fire/disturbance tolerant shrubs. 4.2 back 4.1 – Can go back to 4.1 if given enough time for shrubs to recover.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Long-lived shrubs**			62–140	
	creosote bush	LATR2	*Larrea tridentata*	62–118	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	22–62	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	6–39	–
	Joshua tree	YUBR	*Yucca brevifolia*	1–22	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	1–11	–
	Sandberg bluegrass	POSE	*Poa secunda*	1–11	–
	Forb, perennial	2FP	*Forb, perennial*	1–11	–
	milkvetch	ASTRA	*Astragalus*	1–11	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–11	–
2	**Short-lived shrubs**			84–224	
	Joshua tree	YUBR	*Yucca brevifolia*	1–11	–
Grass/Grasslike					
1	**Perennial grasses**			45–90	
	burrobush	AMDU2	*Ambrosia dumosa*	78–140	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	22–62	–
	spiny hopsage	GRSP	*Grayia spinosa*	6–39	–
	Forb, annual	2FA	*Forb, annual*	1–39	–
	Grass, annual	2GA	*Grass, annual*	1–22	–
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	1–22	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	1–22	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	1–22	–
	Cooper's goldenbush	ERCO23	*Ericameria cooperi*	1–22	–
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	1–22	–
	water jacket	LYAN	*Lycium andersonii*	1–22	–
	Mojave indigobush	PSAR4	*Psorothamnus arborescens*	1–22	–
	longspine horsebrush	TEAX	*Tetradymia axillaris*	1–22	–
2	**Annual grasses**			1–22	
Forb					
1	**Perennial forbs**			6–34	
	beavertail pricklypear	OPBA2	*Opuntia basilaris*	1–2	–
2	**Annual forbs**			1–39	

Animal community

This site provides habitat for many species of wildlife. Small mammals common to this site include antelope ground squirrels; Merriams, Panamint and desert kangaroo rats; grasshopper and deer mice; black-tailed jackrabbits and coyotes. Several species of lizards occur on this site including desert horned lizards, western whiptails, zebra-tailed lizards and side-blotched lizards. Snakes include rosy boa and the Mojave rattlesnake. Birds occurring on this site include common ravens, horned larks, rock wrens, great roadrunners, black-throated and sage sparrows and raptors. The soils also provide suitable burrowing habitat for the desert tortoise.

Management for this site would be to protect it from excessive disturbance and maintain existing plant cover. Access to non-essential roads and trails should be closed. These and other disturbed areas should be revegetated. Water developments would increase the diversity of the site.

Grazing Interpretations:
This site is suitable for spring grazing by sheep and also cattle where water is available. White bursage is fair browse for cattle and horses. Sheep also use this shrub, feeding primarily on new growth and seeds. Creosotebush is unpalatable to livestock and is used primarily for shade. During favorable years, annual forbs and grasses provide abundant forage. Slopes greater than 15% may be a limiting factor.

General guide to initial stocking rate:
Before making specific recommendations, an on-site evaluation must be made. Stocking rate based on proper use factors and proportion of grazeable forage.
Air-dry production in a normal year: 350 lb/acre

Hydrological functions

Runoff is negligible to medium. Soils have slow to high infiltration rates. Small fluvial channels are common on slopes greater than 4 percent.

Hydrologic soil group B (e.g. Helendale, Machone): Soils have moderate infiltration rates when thoroughly wetted. They consist of moderately deep to deep, and moderately well-drained to well-drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

Hydrologic soil group D (e.g. Randsburg): Soils have very slow infiltration rates when thoroughly wetted. They consist of clay soils with high swelling potential, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of transmission.

Hydrologic condition:
Good - >70% ground cover (includes litter, grass, and shrub overstory)
Fair - 30 to 70% ground cover
Poor - <30% ground cover

Hydrologic conditions and runoff curves:
Group B: good-fair-poor = 68-72-77
Group D: good-fair-poor = 84-86-88

Recreational uses

This site is highly valued for open space and those interested in desert ecology. Uses also include off-road vehicle use, horseback riding, mountain biking, and jogging. Desert tortoise and flowering wildflowers may also attract visitors during the spring.

Wood products

No wood products are associated with this ecosite.

Other information

Military Operations - Land clearing or other disturbances that destroys the vegetation and soil structure can result in increased erosion, soil blowing and barren areas. Off-road vehicles should be limited to existing roads and trails. Species indigenous to this site are recommended for re-vegetation efforts.

Inventory data references

Sampling technique:

11 NV-ECS-1
1 SCS-Range 417

Type locality

Location 1: Kern County, CA	
Township/Range/Section	T10N R12W S35
General legal description	Rosamond Hills, CA

Other references

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Contributors

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Approval

Kendra Moseley, 10/21/2024

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	11/22/2024
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:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
