USDA Natural Resources
Conservation Service

Ecological site R030XY129CA
Gypsic Flat 3-5" P.Z.

Last updated: 2/24/2025
Accessed: 07/11/2025

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.

Hyper-Arid Mojave Land Resource Unit (XD)

LRU notes

The Mojave Desert is currently divided into 4 Land Resource Units (LRUs). This ecological site is within the Hyper-Arid Mojave LRU, extremely hot and dry low elevation troughs within the Mojave Desert. The Hyper-Arid Mojave LRU is designated by the 'XD' symbol within the ecological site ID. This LRU is found within the Death Valley/Mojave Central Trough, as well as portions of the Mojave exposed to the Salton Sea Trough and the Colorado River Valley. This LRU is essentially equivalent to the Death Valley/Mojave Central Trough, Arid Valleys and Canyonlands, and associated Mojave Sand Dunes and Mojave Playas of EPA Level IV Ecoregions.

Elevations range from -280 to 1650 feet with precipitation is less than 4 inches per year. This LRU is distinguished by its extremely aridity where a nearly barren landscape is occupied by widely spaced shrubs. Vegetation includes creosote bush, burrobush, big galleta grass with many annual species able to take advantage of infrequent precipitation events which occur in this LRU. Playa species such as Mojave seablite and saltbush species are also common in this LRU.

Classification relationships

Desert Sink Scrub (Holland 1986)

Bush Seepweed Series (Sawyer and Keeler-Wolf 1995)

Ecological site concept

This ecological site is found within the playa landscape on landforms such as a flood-plain playa or alluvial flat where moisture accumulation, through flooding, ponding or subsurface flow, contribute to the development or maintenance of a gypsic or salic horizon. This site is found on playas or portions of playas receiving water from smaller watersheds, usually less than 100,000 acres. Ephemeral streams terminating at this ecological site are typically stream order 3 or smaller.

The central concept for this ecological site is within the Soil Survey of the Marine Corps Air

Ground Combat Center at Twentynine Palms, California (CA699) on the Amboycrater components of the 253 - Amboy crater-Gypboy association, 0 to 15 percent slopes map unit.

This is a group concept and provisional STM that also covers the following ecological sites: R030XB257CA, R030XB127CA, R030XY127CA, R030XD132CA, R030XY132CA, R030XY160CA

Associated sites

R030XY046NV	**OUTWASH PLAIN** Outwash Plain
R030XY132CA	**Saline Flat 3-5" P.Z.** Saline Flat 3-5

Similar sites

R030XY127CA	**Sodic Dune 3-5" P.Z.** R030XY127CA is a buried community phase of R030XD129CA.
R030XY047NV	**ALLUVIAL PLAIN** Alluvial Plain - Allscale dominant, Mojave seablite minor component; more productive site.
R030XY132CA	**Saline Flat 3-5" P.Z.** This is the same ecological site concept as R030XD129CA. The plant community described in R030XY132CA may be indicative of increased salinity for several reasons with one of those due to salt accumulation in plant material.
R030XY046NV	**OUTWASH PLAIN** Outwash Plain - Mojave seablite minor component; more productive site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Suaeda moquinii* (2) *Atriplex polycarpa*
Herbaceous	Not specified

Physiographic features

This site occurs on flood-plain playa and alluvial flats. Elevations are 590 to 655 feet. Slopes range from 0 to 4 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Flood-plain playa
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Occasional
Ponding duration	Brief (2 to 7 days)
Ponding frequency	Occasional
Elevation	590–655 ft
Slope	0–4%
Aspect	Aspect is not a significant factor

Climatic features

The climate on this site is arid, characterized by warm, moist winters (30 to 60 degrees F) and hot, dry summers (70 to 110 degrees F). The average annual precipitation ranges from 2 to 5 inches with most falling as rain from November to March. Approximately 30% of the annual precipitation occurs from July to September as a result of summer convection storms. Mean annual air temperature is 69 to 75 degrees F.

The average frost-free period is 300 to 360 days.

Table 3. Representative climatic features

Frost-free period (average)	360 days
Freeze-free period (average)	360 days
Precipitation total (average)	5 in

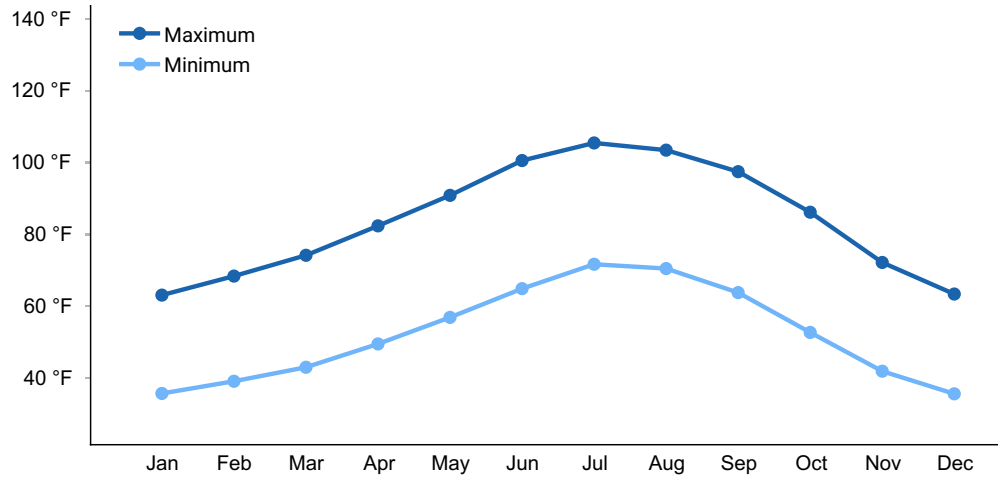


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

This site is subject to occasional flooding and ponding.

Soil features

The soils that characterize this site are very deep and well drained. They are formed in lake sediments. Surface textures are fine sandy loams, very fine sandy loams and loamy coarse sands. Subsurface textures are very fine sandy loams, gravelly fine sandy loams and loams. These soils are moderately to strongly alkaline and have a gypsic horizon from 4 to 12 inches. Available water capacity is very low and permeability is moderate. Wind erosion hazard is moderate. Effective rooting depth is 60 inches or more. Water tables are greater than 60 inches. This site is subject to ponding.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	72–150 in
Surface fragment cover <=3"	6%
Available water capacity (0-40in)	0.06–0.08 in
Calcium carbonate equivalent (0-40in)	1–5%
Electrical conductivity (0-40in)	19–182 mmhos/cm
Sodium adsorption ratio (0-40in)	90–150
Soil reaction (1:1 water) (0-40in)	8.1–9

Ecological dynamics

This site is characterized by low productivity with little plant diversity. Disturbance would allow for the introduction of non-native annuals such as schismus and red-stem filaree. Disturbance is also likely to increase fourwing saltbush abundance. On the proposed nuclear waste site at Yucca Mountain, Nevada, fourwing saltbush occurs in both early-successional creosotebush disturbed by heavy equipment and undisturbed creosotebush associations. In blackbrush communities on Yucca Mountain, it occurs on disturbed sites but is nearly absent from undisturbed sites (Gabbert et. al 1995).

This is a highly dynamic ecological site where drought, floods, and wind can move sediment and salts to either bury, remove, drown or dehydrate vegetation. Additionally, Mojave seablite can increase the salinity of soil surface horizons by concentrating salts from lower depths, possibly creating hospitable conditions for species such as iodinebush and making the site inhospitable for other species (MacKay 2013).

Sparse vegetation makes fire an unlikely player in ecosystem dynamics at this site. Additionally, chenopod foliage appears to have fire-retarding qualities associated with the salt content of the leaves. A severe fire, however, will typically kill the aboveground portions. If burned, saltbushes can re-sprout from the root crown or underground portions of the stem. These species can also become established through an abundance of wind-dispersed seed from adjacent unburned sites.

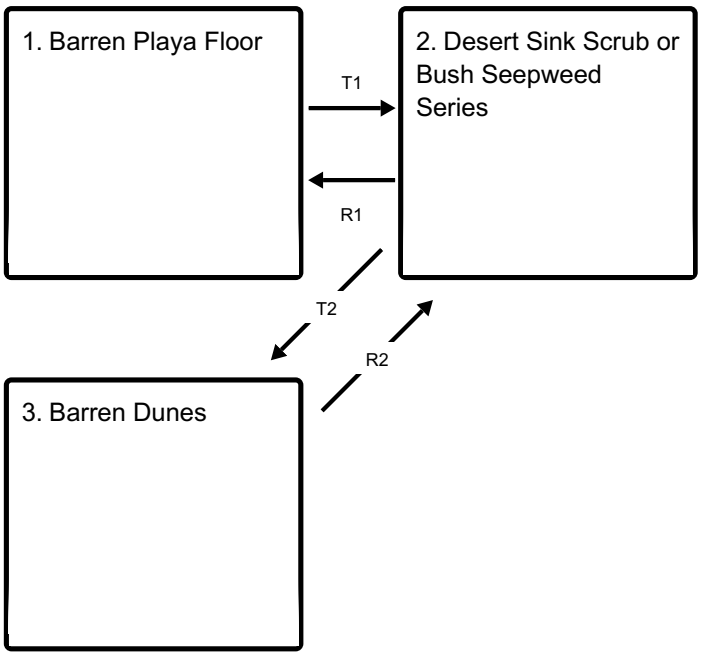
Mojave seablite is considered poor forage for livestock. Cattle and fourwing saltbush are considered valuable browse. Management for this site would be to protect it from excessive disturbance and maintain existing plant cover. Close roads and trails no longer being used and revegetate using native species indigenous to this site. Removal of weedy species and an appropriate monitoring program are also recommended.

Fourwing saltbush is adaptable on sites with declining water tables, brackish groundwater, or saline soils (Doria and Aldon 1993). Species indigenous to this site are recommended for any revegetation efforts. Fourwing saltbush and allscale have been widely used for rehabilitating sites in southern and northern desert shrublands. Seed may be broadcast or drill-seeded, but broadcasting often produces better results. Direct seeding should be done during the fall and winter months when low soil temperatures and high soil moisture are favorable for germination. Seeding success is generally sporadic.

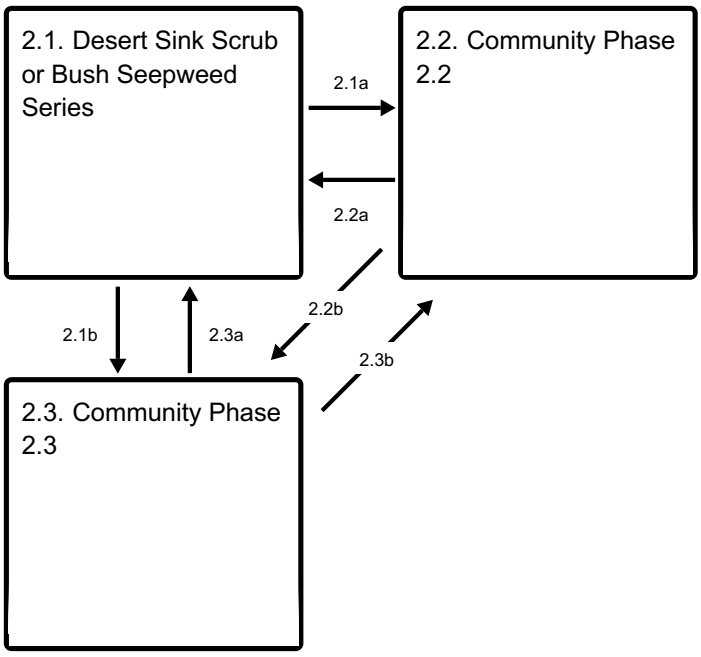
Transplanting seedlings is more effective than direct seeding. Seedlings tend to be more drought tolerant and less susceptible to predation. The soil profile should be irrigated prior to transplanting and supplemental irrigation is recommended for the first growing season. Protection from rodents is also recommended.

State and transition model

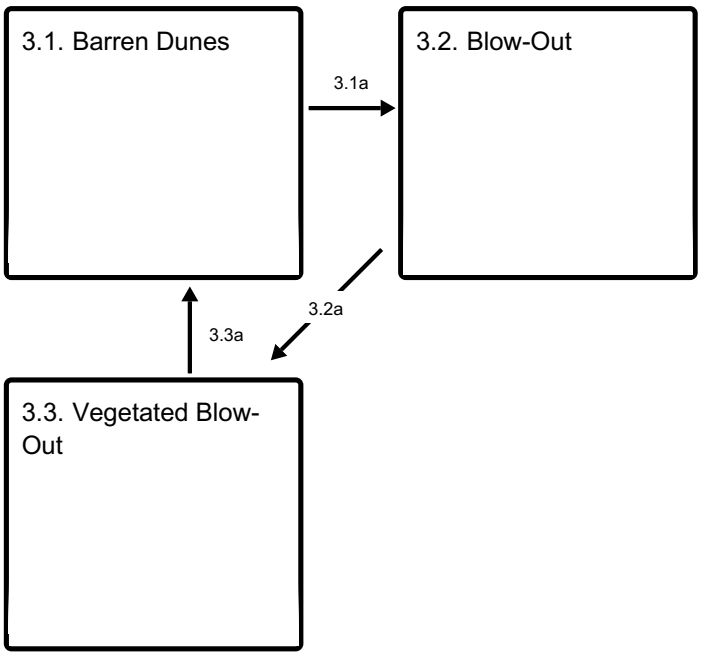
Ecosystem states



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Barren Playa Floor

Playa surface conditions such as salinity, crusts, and smoothness prevent seed retention, germination and seedling establishment. Until these conditions are altered through surface cracking, erosion and deposition; very little vegetation is able to grow, survive and thrive.

State 2
Desert Sink Scrub or Bush Seepweed Series

The interpretative plant community is the historic climax plant community. This site occurs adjacent to dry lake beds and is characterized by a low open shrubland dominated by alkali-tolerant chenopods, especially *Suaeda moquinii*. Perennial grasses and forbs are sparse. Annuals are sparse and seasonally present. This site is stable in this condition. Vegetative composition is about 90% shrubs, 5% grasses and 5% forbs. Approximate ground cover (basal and crown) is 2 to 10 percent.

Community 2.1
Desert Sink Scrub or Bush Seepweed Series

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Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	69	136	316
Grass/Grasslike	3	7	17
Forb	3	7	17
Total	**75**	**150**	**350**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	2-9%
Grass/grasslike foliar cover	0-1%
Forb foliar cover	0-1%
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%

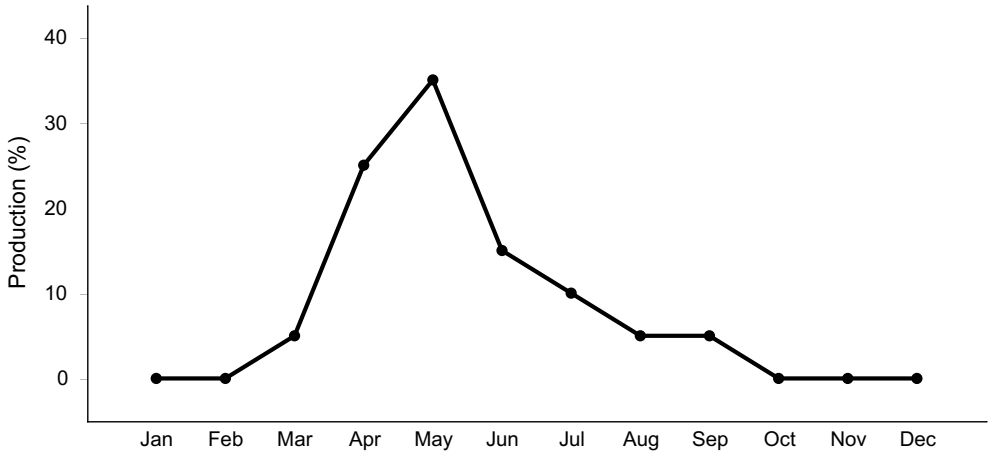

Figure 3. Plant community growth curve (percent production by month). CA3008, Fourwing saltbush. Growth begins in spring to early summer. Flowering occurs from May through September, and fruit ripens from October to December. Seed dispersal occurs from October through April. Seed may remain on the plants from one to two years..

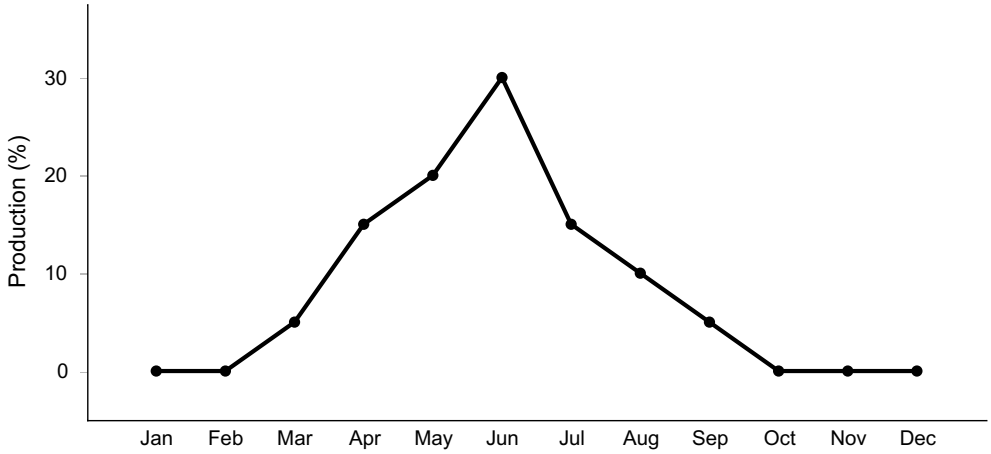

Figure 4. Plant community growth curve (percent production by month). CA3010, Mojave Seablite. Growth begins in early spring; flowering occurs from July to September..

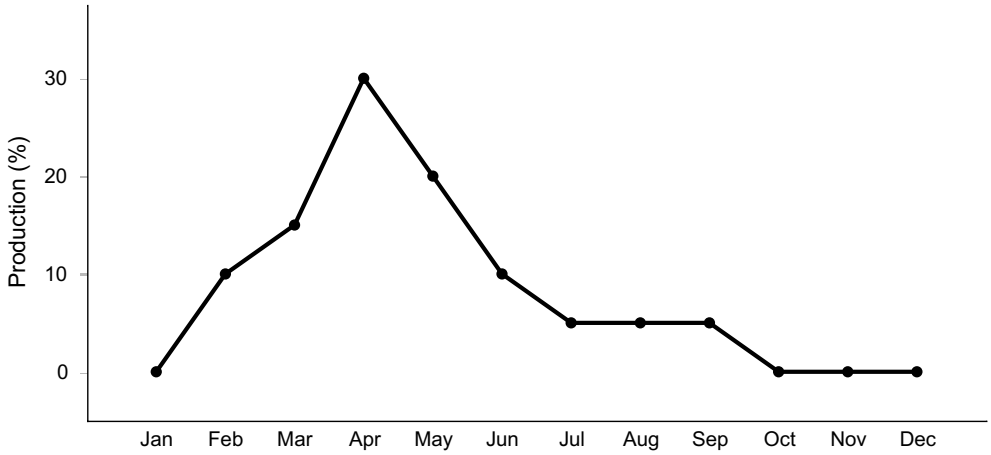

Figure 5. Plant community growth curve (percent production by month). CA3007, Allscale Saltbush. Growth begins in early spring; flowering and seed set occurs by October..

Community 2.2
Community Phase 2.2

Community Phase 2.2 is an at risk community phase. Reduced vegetation cover exposes loose sandy surfaces to wind and water erosion. Wind erosion rates can increase exponentially as vegetation and biological crust cover is lost (Belnap 2003, Li et al. 2005).

Community 2.3
Community Phase 2.3

Perennial vegetation is decreasing and being buried. Annual dune species are seasonally abundant in the inter-shrub spaces.

Pathway 2.1a
Community 2.1 to 2.2

Drought or altered hydrology lead to branch pruning and die off.

Pathway 2.1b
Community 2.1 to 2.3

Upstream or upwind disturbance leads to large sediment deposition at this site.

Pathway 2.2a
Community 2.2 to 2.1

A year with above average precipitation enables plants to thrive.

Pathway 2.2b
Community 2.2 to 2.3

Continued drought or altered hydrology, especially upstream or upwind of this site causes sediment accumulation rates much greater than sediment removal rates.

Pathway 2.3a
Community 2.3 to 2.1

Above average precipitation allows upstream or upwind perennial vegetation to rebound and reduces sediment deposition at this site.

Pathway 2.3b
Community 2.3 to 2.2

Drought or altered hydrology lead to branch pruning and die off.

State 3
Barren Dunes

Vegetation traps moving sediment and accumulation occurs beneath the vegetation. Changes in hydrology, climate and other types of upstream or upwind disturbances may accelerate sediment accumulation to the point of vegetation burial (Laity 2003). Accumulation could also be slow enough to allow some of the existing vegetation to survive while species typical of drier sites begin to establish on the semi-stable dunes.

Community 3.1
Barren Dunes

Sediment deposition rates have exceeded removal rates. Deposition has buried all perennial vegetation.

Community 3.2
Blow-Out

Loose sediment has been removed usually to a more stable surface which initially is barren.

Community 3.3
Vegetated Blow-Out

The blow-out area, may also be known as a playette landform, begins to host annual species and pioneering perennial species. Annual species create a microsite for perennial species establishment.

Pathway 3.1a
Community 3.1 to 3.2

Droughty conditions and high winds lead to a dune blowout where a stable surface is exposed.

Pathway 3.2a
Community 3.2 to 3.3

Annual species become seasonally abundant, creating microsites for perennial species establishment.

Pathway 3.3a
Community 3.3 to 3.1

Drought years with below average precipitation or altered hydrology lead to barren dunes.

Transition T1
State 1 to 2

Surface disturbance such as cracking, rill formation, tire tracks and sediment deposition provide a site for seed retention, germination and seedling establishment.

Restoration pathway R1
State 2 to 1

Altered hydrology or drought leads to an already sparsely vegetated area to die-off and convert back to the barren playa floor.

Transition T2
State 2 to 3

Altered hydrology, drought or any other type of upstream or upwind activities which removes vegetation and allows sediment migration to this site.

Restoration pathway R2
State 3 to 2

Restored hydrology or following years with above average precipitation, dunes and inter-dune areas are stabilized by a robust vegetation community.

Additional community tables

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
1				30–150	
	Mojave seablite	SUMO	*Suaeda moquinii*	30–150	–
2				20–75	
	cattle saltbush	ATPO	*Atriplex polycarpa*	15–40	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	5–25	–
Grass/Grasslike					
3				4–10	
	saltgrass	DISP	*Distichlis spicata*	4–10	–
4				1–3	
	sixweeks grama	BOBA2	*Bouteloua barbata*	1–3	–
Forb					
5				3–9	
	smallseed sandmat	CHPO12	*Chamaesyce polycarpa*	2–8	–

Animal community

This site has low species diversity. Small mammals that may occur include round-tailed ground squirrels and Merriams kangaroo rats. Coyotes and black-tailed jackrabbits may also occur. Lizards common to this site include western whiptails and zebra-tailed lizards. Birds occurring on this include horned larks, black-throated sparrows, loggerhead shrikes and common ravens.

Season of Use- Other Mgt. Considerations: This site has limited use for livestock grazing

due to very low productivity and lack of stock water. Mojave seablite is considered poor forage for livestock. Allscale and fourwing saltbush are considered valuable browse. Fourwing saltbush has fair to good forage value for domestic sheep and goats, and at least fair forage value for cattle. Fourwing saltbush can withstand heavy grazing, however, overgrazing can eliminate allscale saltbush from this site.

General guide to initial stocking rate. Before making specific recommendations, an on-site evaluation must be made.

Pounds/acre
air dry AUM/AC AC/AUM
Normal Years 100

Hydrological functions

Runoff is very low. Hydrologic soil group B - soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well drained to well drained soils with moderately fine to moderately coarse textures. Hydrologic conditions: good - >70% ground cover (includes litter, grass and brush overstory); fair - 30 to 70% ground cover; poor <30% ground cover.

Soil Series:Amboy Crater
Hydrologic Group:B
Hydrologic Conditions and Runoff Curves:
Good 68; Fair 72; Poor 77

Recreational uses

This site is valued for open space and those interested in desert ecology.

Other information

Military Operations - Management for this site would be to protect it from excessive disturbance and maintain existing plant cover. Land clearing or other disturbances that destroy the vegetation can result in soil compaction, reduced infiltration rates, accelerated erosion, soil blowing, barren areas and the introduction of non-native plants.

Inventory data references

Sampling technique

_2_ NV-ECS-1
___ SCS-Range 417
_3_ Other

Other references

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Contributors

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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	07/11/2025
Approved by	Sarah Quistberg
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:

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

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

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

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:**
