USDA Natural Resources
Conservation Service

Ecological site R030XB213AZ
Gypsum Upland 6-9" p.z. Alkaline

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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.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

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

This unit occurs within the Basin and Range Province and is characterized by broad basins, valleys, and old lakebeds. Widely spaced mountains trending north to south occur throughout the area. Isolated, short mountain ranges are separated by an aggraded desert plain. The mountains are fault blocks that have been tilted up. Long alluvial fans coalesce with dry lakebeds between some of the ranges.

LRU notes

AZ LRU 30-2 – Middle Mohave Desert

Elevations range from 1500 to 3200 feet and precipitation averages 6 to 9 inches per year. Vegetation includes creosotebush, white bursage, yucca, prickly pear and cholla species, Mormon tea, flattop buckwheat, ratany, winterfat, bush muhly, threeawns, and big galleta. The soil temperature regime is thermic and the soil moisture regime is typic aridic.

Ecological site concept

This ecological site is located on uplands of relic lake beds. The gypsic soil is moderately deep over gypsite

bedrock. It is strongly effervescent at the surface grading to non-effervescent at 5 inch depth. Gypsum crystal size increases with depth.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex confertifolia* (2) *Ephedra nevadensis*
Herbaceous	Not specified

Physiographic features

The ecological site occurs in an upland position on pediments with naturally occurring sinuous drainages and washes. The higher areas do not benefit from run-on moisture, while the drainages receive some benefit. The site occurs on all aspects.

Table 2. Representative physiographic features

Landforms	(1) Pediment (2) Drainageway (3) Wash
Flooding frequency	None
Ponding frequency	None
Elevation	488–914 m
Slope	2–15%
Aspect	Aspect is not a significant factor

Climatic features

The climate is arid and warm. Annual precipitation ranges from 6 to 9 inches. About 65 percent of the rainfall comes from October through May as gentle rain from Pacific storms which may last for a couple of days. The rest of the rainfall comes during the summer monsoon season from July through September as spotty, brief, intense thunderstorms. Snow rarely falls, and only remains on the ground a few hours at most. Annual air temperature ranges from 59 to 70 degrees F. The average frost-free period ranges from 156 to 259 days.

Table 3. Representative climatic features

Frost-free period (average)	259 days
Freeze-free period (average)	290 days
Precipitation total (average)	229 mm

Influencing water features

Soil features

The soil of this ecological site is moderately deep. The surface texture of the soil is fine to very fine sandy loam. Subsoil textures of the soil are sand, loamy sand, and sandy loam, sometimes channery (gypsite). The soil's parent material is colluvium and residuum from gypsiferous lacustrine sediments. The moisture regime of the soil is typic aridic and the temperature regime is thermic. The water erosion hazard is slight to moderate and wind erosion is slight. The plant-soil moisture relationship is poor as the coarse texture, sodium and other salts, and very high gypsum content combine to severely limit plant available water. The interspersed drainages and wahses have more water available for plants.

A typical soil profile is:
C-0 to 1 inch; very fine sandy loam; 7 percent sand and gravel-sized gypsum crystals; strongly effervescent
Cy1-1 to 5 inches; very gravelly sand; 50 percent gravel-sized gypsum crystals, 30 percent sand-sized gypsum crystals; slightly effervescent
Cy2-5 to 20 inches; channery sandy loam; 30 percent channer-sized gypsum crystals; noneffervescent
Cy3-20 to 28 inches; 60 percent weathered gypsite channers; 15 percent gypsite gravel; 10 percent sand-sized gypsum crystals; noneffervescent
Cr-28 inches; gypsite bedrock

The taxonomic classification of the soil is Loamy-skeletal, gypsic, thermic Typic Torriorthents.

Soils correlated to this ecological site include map unit 701044, Gypill soil, Grand Canyon Area, AZ, Parts of Coconino and Mohave Counties SSA.

Table 4. Representative soil features

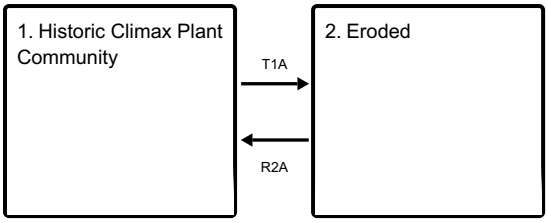
Parent material	(1) Colluvium–rock gypsum
Surface texture	(1) Gypsiferous fine sandy loam (2) Very fine sandy loam
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Moderate
Soil depth	51–76 cm
Surface fragment cover <=3"	0–1%
Surface fragment cover >3"	0–1%
Available water capacity (0-101.6cm)	1.78–6.1 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	2–30 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	2–13
Soil reaction (1:1 water) (0-101.6cm)	7.6–8.2
Subsurface fragment volume <=3" (Depth not specified)	10–50%
Subsurface fragment volume >3" (Depth not specified)	15–60%

Ecological dynamics

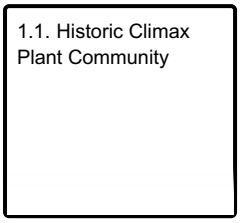
This ecological site is characterized by extremely scattered, salt tolerant shrubs with occasional perennial forbs. The site is stable to natural disturbances but the gypsic soils are extremely vulnerable to erosion once disturbed. Soil chemistry prohibits non-native annual forbs and grasses.

State and transition model

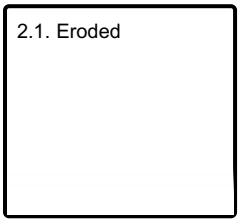
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

This ecological site is characterized by very widely scattered desert shrubs. Shadscale and ephedra are dominant, but white ratany, Fremont dalea and wolfberry are also common. Perennial grasses are almost absent and are confined to drainaages. Perennial and annual forbs are widely scattered although they are a significant component of the plant community because of very low overall production. Typical perennial plant spacing is 3.5-5 feet. Cryptogamic crust formation can be extensive in the absence of repeated disturbance.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	25	39	81
Forb	3	12	27
Grass/Grasslike	–	2	2
Total	**28**	**53**	**110**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-1%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	31-58%
Litter	0%

Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Figure 5. Plant community growth curve (percent production by month). AZ3022, 30.2 6-9" p.z. upland sites. Growth begins in the late winter, most growth occurs in the spring..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	19	33	18	7	7	11	3	0	0	0

State 2
Eroded

Community 2.1
Eroded

Soil surface disturbance initiates extreme erosion events. Shrubs and forbs are pedestalled or absent from eroded areas.

Transition T1A
State 1 to 2

Mechanical soil disturbance such as off-road vehicle trailing.

Restoration pathway R2A
State 2 to 1

None.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				0–2	
	big galleta	PLRI3	*Pleuraphis rigida*	0–2	–
2				0–3	
	Grass, annual	2GA	*Grass, annual*	0–3	–
Forb					
3				1–6	
	desert trumpet	ERIN4	*Eriogonum inflatum*	1–6	–
4				1–6	
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–6	–
5				0–1	
	Forb, perennial	2FP	*Forb, perennial*	0–1	–
	desert marigold	BAMU	*Baileya multiradiata*	0–1	–
	dyssodia	DYSSO	*Dyssodia*	0–1	–

	pepperweed	LEPID	*Lepidium*	0–1	–
	princesplume	STANL	*Stanleya*	0–1	–
	wirelettuce	STEPH	*Stephanomeria*	0–1	–
6				0–2	
	Forb, annual	2FA	*Forb, annual*	0–2	–
	milkvetch	ASTRA	*Astragalus*	0–2	–
	flatcrown buckwheat	ERDE6	*Eriogonum deflexum*	0–2	–
	buckwheat	ERIOG	*Eriogonum*	0–2	–
	spurge	EUPHO	*Euphorbia*	0–2	–
	lettuce	LACTU	*Lactuca*	0–2	–
	evening primrose	OENOT	*Oenothera*	0–2	–
	phacelia	PHACE	*Phacelia*	0–2	–
	desert Indianwheat	PLOV	*Plantago ovata*	0–2	–
Shrub/Vine					
7				11–17	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	11–17	–
8				9–15	
	Nevada jointfir	EPNE	*Ephedra nevadensis*	6–9	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	6–9	–
9				3–6	
	white ratany	KRGR	*Krameria grayi*	3–6	–
10				2–4	
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	2–4	–
11				1–3	
	water jacket	LYAN	*Lycium andersonii*	1–3	–
12				0–3	
	narrowleaf goldenbush	ERLI6	*Ericameria linearifolia*	0–3	–
13				0–3	
	creosote bush	LATR2	*Larrea tridentata*	0–3	–
14				0–6	
	Shrub, other	2S	*Shrub, other*	0–2	–
	burrobush	AMDU2	*Ambrosia dumosa*	0–2	–
	desert brickellbush	BRDE3	*Brickellia desertorum*	0–2	–
	Eastern Mojave buckwheat	ERFAP	*Eriogonum fasciculatum var. polifolium*	0–2	–
	spiny hopsage	GRSP	*Grayia spinosa*	0–2	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–2	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–2	–
	Mojave yucca	YUSC2	*Yucca schidigera*	0–2	–

Type locality

Location 1: Mohave County, AZ	
Township/Range/Section	T33N R15W S5

General legal description	Lake Mead National Recreation Area; Gyp Hills 7.5 quad.

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	05/12/2025
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:

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:**

17. **Perennial plant reproductive capability:**