USDA Natural Resources
Conservation Service

Ecological site R030XB224AZ
Gypsum Fan 6-9" p.z.

Last updated: 10/21/2024
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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.

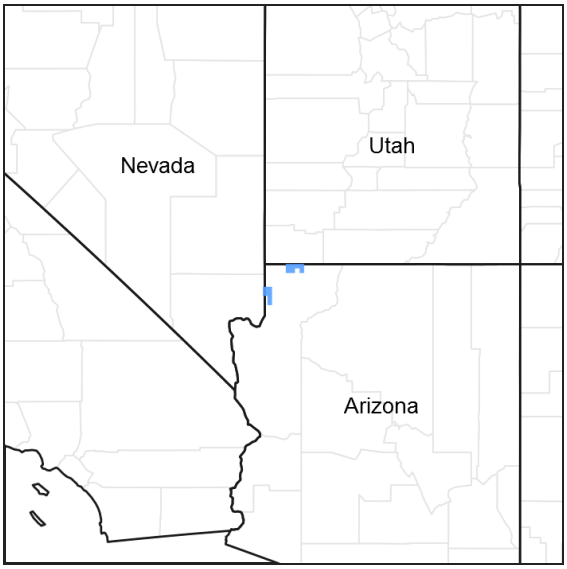


Figure 1. Mapped extent

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 found on gently sloping uplands. The calcareous soils are non-skeletal, deep, and have

visible gypsum crystals at depths within the profile. Soil texture is sandy loam throughout.

Associated sites

R030XB208AZ	**Gypsum Hills 6-9" p.z.**
R030XB222AZ	**Gypsum Hills 6-9" p.z. Alkaline**
R030XB225AZ	**Loamy Wash 6-9" p.z. Gypsic**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ambrosia dumosa* (2) *Ephedra nevadensis*
Herbaceous	(1) *Pleuraphis rigida*

Physiographic features

This ecological site is found in an upland position on summits of fan terraces.

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Fan
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	488–975 m
Slope	3–20%
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 deep to very deep. It is highly gypsiferous, being formed from mixed alluvium from gypsiferous sedimentary layers of the Kaibab and Moenkopi formations. The surface texture of the soil is generally very gravelly fine sandy loam. Subsurface textures include fine sandy loam, sand, very cobbly sandy loam and loam.

The soil permeability is moderately rapid to rapid. It is naturally a very erosive soil with a hazard of erosion by water of moderate to very severe and by wind of moderate. It is a non-saline, non-sodic soil with a PH of 7.6 to 8.2 (slightly to moderately alkaline).

A typical profile is:
0 to 2 inches; very gravelly fine sandy loam
2 to 12 inches; calcareous loam
12 to 29 inches; gypsiferous sandy loam that has 40 to 80 percent crystalline gypsum as sand-size particles
29 to 32 inches; crystalline gypsum
32 to 40 inches; gypsiferous sandy loam that has 50 percent crystalline gypsum
40 to 60 inches; very cobbly sandy loam that has 80 percent gypsum

This ecological site has been correlated to map unit 623067, Ruesch soil, Shivwits Area, AZ, SSA.

Table 4. Representative soil features

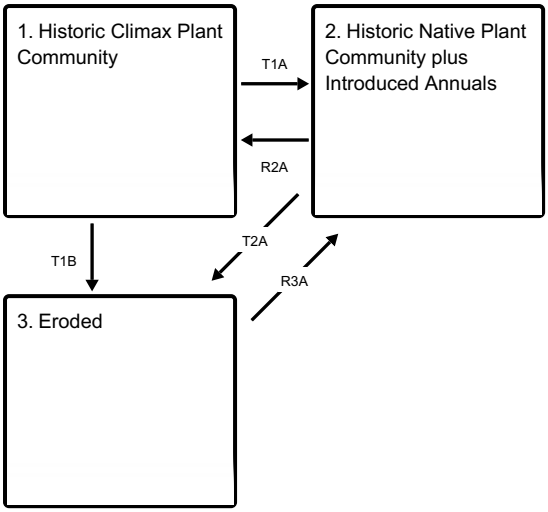
Parent material	(1) Alluvium–rock gypsum
Surface texture	(1) Very gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Somewhat excessively drained
Permeability class	Moderately rapid
Soil depth	152 cm
Surface fragment cover <=3"	40–50%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.16–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	6–23%
Electrical conductivity (0-101.6cm)	2–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

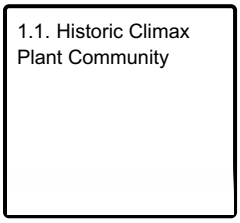
This ecological site is dominated by dispersed desert shrubs. Perennial grasses and forbs are present in natural depressions. Annual forbs and grasses flourish following rainfall. Natural disturbances are rare; however, the gypsiferous soils are vulnerable to water erosion after soil disturbance. After introduction of non-native annuals (forbs and/or grasses), the shift in total productivity with shift slightly toward seasonal herbaceous production following periods of rain. Dominant shrubs are creosote and white bursage. Assorted half-shrubs are widely scattered.

State and transition model

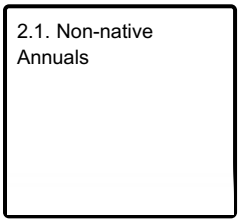
Ecosystem states



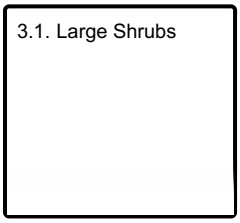
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

The dominant aspect is mixed desert shrub with scattered perennial grasses. Dominant shrubs are white bursage, Nevada Mormon Tea, white ratany and Fremont dalea. The dominant grass is big galleta. Broom snakeweed will increase with severe disturbance, Russian thistle and red brome will invade.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	103	241	412
Grass/Grasslike	7	28	69
Forb	2	11	22
Total	**112**	**280**	**503**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	1-3%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	1-3%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	0-2%	–
>0.3 <= 0.6	–	–	–	–
>0.6 <= 1.4	–	9-11%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

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
Historic Native Plant Community plus Introduced Annuals

Community 2.1
Non-native Annuals

This plant community resembles the historic native plant community, but exotic annuals have been introduced. Non-native species include red brome, Mediterranean grass (Schismus spp.), and filaree. The flourish of non-native annuals that occurs following rainfalls may preclude native annuals.

State 3
Eroded

Community 3.1
Large Shrubs

The understory of the plant community is diminished. Active water erosion is indicated by extensive water flow patterns and pedestalling of cobbles and perennial plant bases. In extremely eroded conditions, rills are connected and gullies are present. Non-native annuals will flourish in protected areas after wet winters.

Transition T1A
State 1 to 2

Introduction of non-natvie annual forb and grass seed.

Transition T1B
State 1 to 3

Mechanical soil disturbance such as trailing from off-road vehicles, unplanned road or trail development, or trailing by livestock. Off-site accelerated run-on from trails, roads, adjacent farm fields, or dam building.

Restoration pathway R2A
State 2 to 1

None known.

Transition T2A
State 2 to 3

Mechanical soil disturbance such as trailing from off-road vehicles, unplanned road or trail development, or trailing by livestock. Off-site accelerated run-on from trails, roads, adjacent farm fields, or dam building.

Restoration pathway R3A
State 3 to 2

Unknown, possible removal of off-road vehicles, prescribed grazing/no grazing.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				13–28	
	big galleta	PLRI3	*Pleuraphis rigida*	13–28	–
2				2–6	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	2–6	–
3				2–9	
	Grass, annual	2GA	*Grass, annual*	0–4	–
	Grass, perennial	2GP	*Grass, perennial*	0–4	–
	threeawn	ARIST	*Aristida*	0–4	–

	threeawn	ARIST	*Aristida*	0–4	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	0–4	–
	burrograss	SCBR2	*Scleropogon brevifolius*	0–4	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–4	–
	gyp dropseed	SPNE	*Sporobolus nealleyi*	0–4	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–4	–
Forb					
4				2–6	
	Forb, perennial	2FP	*Forb, perennial*	0–2	–
	desert marigold	BAMU	*Baileya multiradiata*	0–2	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–2	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	0–2	–
5				2–6	
	Forb, annual	2FA	*Forb, annual*	0–2	–
	buckwheat	ERIOG	*Eriogonum*	0–2	–
	phacelia	PHACE	*Phacelia*	0–2	–
Shrub/Vine					
6				56–84	
	burrobush	AMDU2	*Ambrosia dumosa*	56–84	–
7				28–56	
	Nevada jointfir	EPNE	*Ephedra nevadensis*	28–56	–
8				28–56	
	white ratany	KRGR	*Krameria grayi*	28–56	–
9				13–43	
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	13–43	–
10				13–28	
	creosote bush	LATR2	*Larrea tridentata*	13–28	–
11				13–28	
	water jacket	LYAN	*Lycium andersonii*	13–28	–
12				9–22	
	banana yucca	YUBA	*Yucca baccata*	9–22	–
13				6–13	
	winterfat	KRLA2	*Krascheninnikovia lanata*	6–13	–
14				2–6	
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	2–6	–
15				2–6	
	pricklypear	OPUNT	*Opuntia*	2–6	–
16				0–2	
	burrobrush	HYSA	*Hymenoclea salsola*	0–2	–
17				0–6	
	Shrub, other	2S	*Shrub, other*	0–2	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–2	–
	echinocactus	ECHIN2	*Echinocactus*	0–2	–
	button brittlebush	ENFR	*Encelia frutescens*	0–2	–

	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–2	–
	pricklypear	OPUNT	*Opuntia*	0–2	–

Animal community

Wildlife species found on this ecological site include coyote, jackrabbit, desert cottontail, striped skunk, antelope squirrel, pocket gopher, gopher snake, Mohave rattlesnake, western rattlesnake, raven, pocket mouse, and kangaroo rat.

Contributors

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Stephen Cassady

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	05/13/2025
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:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**

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

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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):**

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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:

    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:**
