

Ecological site R040XC317AZ Saline Upland 3"-7" p.z.

Last updated: 3/04/2025
Accessed: 04/16/2025

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): 040X–Sonoran Basin and Range

Major Land Resource Area (MLRA) 40 is the portion of Sonoran Desert that extends from northwest Mexico into southwestern Arizona and southeastern California. This MLRA is hot desert characterized by bimodal precipitation coupled with hot summers and mild winters. These conditions give rise to a rich biological diversity visually dominated by columnar cactus (saguaro) and leguminous trees (palo verde). This unit occurs within the Basin and Range Physiographic Province and is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys and basins. Igneous and metamorphic rock classes dominate the mountain ranges, and basin sediments are combinations of fluvial, lacustrine, colluvial and alluvial deposits.

LRU notes

Land Resource Unit (LRU) 40-3, Colorado Sonoran Desert, is characterized by desert scrub vegetation with a high amount of desert pavement on relict fan remnants. Trees are common only in large washes and hillslopes. Elevations range from 300 to 1200 feet, and precipitation averages 3 to 7 inches per year. Vegetation includes creosotebush, white bursage, brittlebush, Mormon tea, teddybear cholla, elephant tree, smoke tree, ocotillo, and big galleta. The soil temperature regime is hyperthermic and the soil moisture regime is typic aridic.

Classification relationships

USDA-NRCS Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin: Western Range and Irrigated Region D Major Land Resource Area 40 - Sonoran Basin and Range Land Resource Unit 3 - Colorado Sonoran Desert Ecological Site Saline Upland, 3"-7" p.z.

U.S. Environmental Protection Agency, Ecological Regions of North America: Level I, Region 10 North American Deserts Level II, 10.2 Warm Deserts Level III, Ecoregion 81, Sonoran Basin and Range Level IV, 81I, 81n, 81o

USDA-USFS Ecological Subregions: Sections of the Conterminous United States Section 322 American Semidesert and Desert Province Section 322B, Sonoran Desert

Ecological site concept

Saline Upland, 3"-7" p.z., occurs on upland positions. Soils are slightly to strongly saline. Aspect is desert shrubland.

Associated sites

R040XC302AZ	Limy Slopes 3"-7" p.z.
R040XC314AZ	Saline Swale 3"-7" p.z.

Similar sites

R040XB226AZ	Sandy Loam Upland, Saline 7"-10" p.z.
-------------	---------------------------------------

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Allenrolfea occidentalis</i> (2) <i>Atriplex lentiformis</i>
Herbaceous	Not specified

Physiographic features

Climatic features

Annual precipitation ranges from 3 to 7 inches. Annual rainfall is bimodal, with distinct rainy seasons occurring from December to March (winter) and July to September (summer). Rainfall ratios range from 40:60 (winter:summer). Rainfall intensity differs between rainfall seasons. Winter frontal storms develop in the Pacific Ocean and Gulf of California, producing widespread, low-intensity and long duration precipitation events. Winter precipitation is the more dependable water source for vegetation, and snowfall is very rare. During summer months, atmospheric activity in the Gulf of Mexico produces convective thunderstorms when crossing over the mountains in the afternoon. These storms travel across the plains and valleys, producing precipitation of short duration, usually less than 30 minutes, but of moderate to heavy intensity. However, these thunderstorms often produce little more than gusty winds and light showers. Between these two seasons, little to no effective precipitation can occur for several months at a time. May and June are the driest months, and overall humidity is very low.

Overall, average annual rainfall is variable, but increases in variability from east to west across the region. For long-term precipitation data, the coefficient of variation, the ratio of the standard deviation to the mean expressed as a percentage, increases from 44% at Gila Bend (east) to 65% at Mohawk (west).

Winter temperatures are very mild, with an average of 53°F in January, with recorded extremes of 10°F. Summertime temperatures are hot to very hot, averaging 93°F in July, and with recorded extremes of 125°F. Spring and summer growing seasons are equally important for perennial grass, forb and shrub and tree growth. With above average precipitation, cool and warm season annuals, forbs and grasses can be common in their respective seasons. Perennial forbs may only be visible above ground following rainfall events.

Table 2. Representative climatic features

Frost-free period (average)	303 days
Freeze-free period (average)	348 days
Precipitation total (average)	7 in

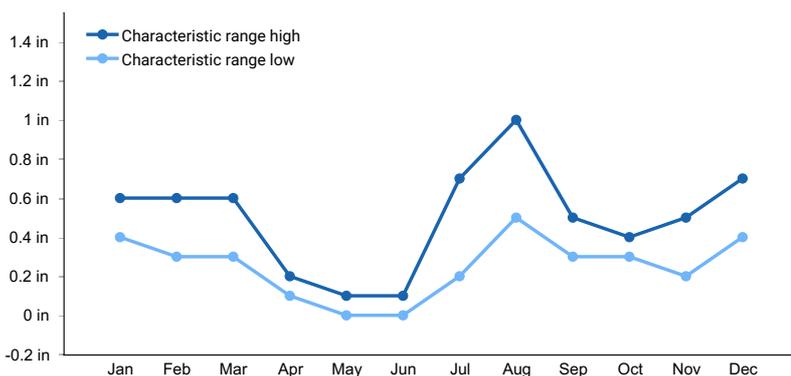


Figure 1. Monthly precipitation range

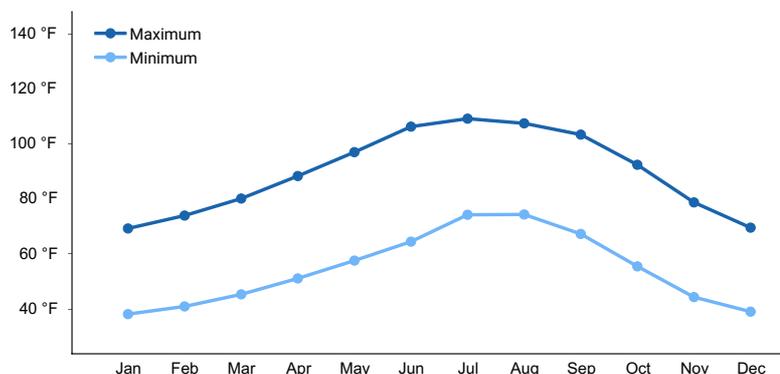


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

Soil features

These typically deep soils can have a shallow to moderately deep layer with a high concentration of soluble salts. The surface layer depths range from 2 to 6 inches, with a silt loam texture. Subsoil texture is silt loam, with a clay layer occurring at or below 40 inches. Upper profile permeability is moderate, and subsoil moisture holding capacity exceeds moisture inputs. Soluble salt accumulations are high, and soil pH ranges from 7.9 to 8.4. Surface infiltration rates are high in the presence of sufficient vegetative cover. Stability to erosion processes is poor due to high soil salinity. The profile typically lacks coarse fragments.

Table 3. Representative soil features

Surface texture	(1) Gravelly loamy sand (2) Extremely gravelly sandy loam (3) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderately slow to rapid
Soil depth	60 in
Surface fragment cover <=3"	0–65%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–9 in
Calcium carbonate equivalent (0-40in)	5–35%
Electrical conductivity (0-40in)	4–16 mmhos/cm
Sodium adsorption ratio (0-40in)	0–13
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The only observed Saline Upland, 3" -7" p.z., plant community is a mixed shrubland with salt tolerant species.

State and transition model

Ecosystem states

1. Shrubland

State 1 submodel, plant communities

1.1. Mixed Salt-Tolerant Shrubs (Reference)

State 1 Shrubland

Community 1.1 Mixed Salt-Tolerant Shrubs (Reference)

The native plant community is a mixture of low, salt-tolerant desert shrubs with a very sparse understory of annual grasses and forbs. This plant community will deteriorate from overuse, allowing desert saltbush and thinleaf fourwing saltbush to decrease in extent and less desirable species such as seepweed, mesquite, and greasewood to increase in cover.

Table 4. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	560	615	675
Grass/Grasslike	35	70	110
Forb	35	55	75
Total	630	740	860

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				35–110	
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0–10	–
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0–10	–
	needle grama	BOAR	<i>Bouteloua aristidoides</i>	0–5	–
	threeawn	ARIST	<i>Aristida</i>	0–3	–
	littleseed muhly	MUMI	<i>Muhlenbergia microsperma</i>	0–3	–
	tobosagrass	PLMU3	<i>Pleuraphis mutica</i>	0–3	–
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	0–3	–
Forb					
2				35–75	
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0–10	–
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	0–10	–
	devil's spineflower	CHRI	<i>Chorizanthe rigida</i>	0–5	–
	desert marigold	BAMU	<i>Baileya multiradiata</i>	0–3	–
Shrub/Vine					
3				260–525	
	cattle saltbush	ATPO	<i>Atriplex polycarpa</i>	260–525	–
4				35–110	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	35–110	–
5				35–110	
6				35–75	
	desert-thorn	LYCIU	<i>Lycium</i>	0–15	–
	creosote bush	LATRT	<i>Larrea tridentata var. tridentata</i>	2–10	–
	yellow paloverde	PAMI5	<i>Parkinsonia microphylla</i>	2–5	–
7				35–75	
	big saltbush	ATLE	<i>Atriplex lentiformis</i>	5–20	–
	snakewood	CONDA	<i>Condalia</i>	5–20	–
8				5–15	
	candy barrelcactus	FEWI	<i>Ferocactus wislizeni</i>	2–5	–

Other references

Griffith, G.E., Omernik, J.M., Johnson, C.B., and Turner, D.S., 2014, Ecoregions of Arizona (poster): U.S. Geological Survey Open-File Report 2014-1141, with map, scale 1:1,325,000, <https://dx.doi.org/10.3133/ofr20141141>. ISSN 2331-1258 (online)

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Contributors

Steve Barker
Larry D. Ellicott

Approval

Kendra Moseley, 3/04/2025

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	04/16/2025
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:**
