

# Ecological site R030XC381AZ Limestone/Sandstone Cliffs 13-17" p.z.

Last updated: 10/21/2024  
Accessed: 07/11/2025

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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 30-3 – Upper Mohave Desert

Elevations range from 2800 to 4500 feet and precipitation averages 9 to 12 inches per year. Vegetation includes Joshua tree, blackbrush, creosotebush, ratany, bush muhly, big galleta, black grama, desert needlegrass, and Indian ricegrass. The soil temperature regime is thermic and the soil moisture regime is typic aridic.

## Ecological site concept

This ecological site is located on extremely steep slopes. Slopes arise abruptly to near vertical. Soils are non-calcareous, very shallow over limestone or sandstone bedrock.

## Associated sites

R030XC380AZ	<b>Sandy Loam Upland 13-17" p.z. Cobbly Surface</b>
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**Table 1. Dominant plant species**

Tree	(1) <i>Quercus gambelii</i> (2) <i>Juniperus osteosperma</i>
Shrub	(1) <i>Artemisia tridentata ssp. wyomingensis</i> (2) <i>Garrya flavescens</i>
Herbaceous	(1) <i>Koeleria macrantha</i>

## Physiographic features

This site occurs on footslopes, backslopes and summits of mountains and escarpments.

**Table 2. Representative physiographic features**

Landforms	(1) Mountain (2) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	5,000–6,500 ft
Slope	35–50%

## Climatic features

Precipitation in this LRU ranges from 13-17 inches. Winter-summer rainfall ratios range from 70-30% to 60-40%. Snowfall is common throughout the area and ranges from a trace to 10 inches. At the lower elevations, snow seldom persists more than a day. Summer rains fall July-September, originate in the Gulf of Mexico, and are convective thunderstorms. Winter moisture is frontal, originates in the northern Pacific, and falls as rain or snow in widespread storms of low intensity and long duration. May and June are the driest months of the year. Humidity is generally low. Temperatures are warm in the summer and cold in the winter. Freezing temperatures are common October-May. Winter-summer rainfall ratios in this LRU average 65% to 35%.

**Table 3. Representative climatic features**

Frost-free period (average)	230 days
Freeze-free period (average)	300 days
Precipitation total (average)	17 in

## Influencing water features

### Soil features

The soils of this site range from shallow to deep with slopes ranging from 35 to 50 percent. They are very gravelly or cobbly on the surface and throughout the soil profile.

A typical soil profile is:

0 to 2 inches-brown very gravelly loam

2 to 14 inches-dark brown and light gray, calcareous very gravelly loam

14 inches-limestone bedrock

Soils correlated to this ecological site include 623095, Yumtheska, Shivwits Area, Arizona, Part of Mohave County Soil Survey Area.

**Table 4. Representative soil features**

Surface texture	(1) Extremely cobbly loam (2) Very cobbly
Family particle size	(1) Loamy
Drainage class	Moderately well drained
Permeability class	Moderate
Soil depth	10–60 in
Surface fragment cover <=3"	40%

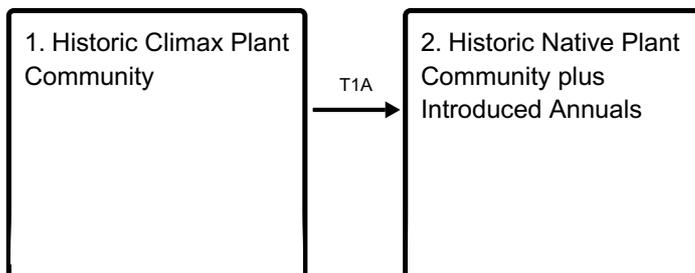
Surface fragment cover >3"	5%
Available water capacity (0-40in)	1.4–2.4 in
Calcium carbonate equivalent (0-40in)	0–10%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	40%
Subsurface fragment volume >3" (Depth not specified)	5%

## Ecological dynamics

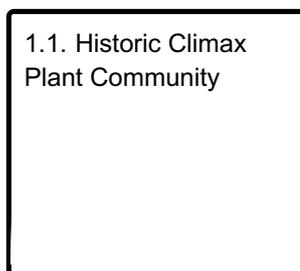
Limestone/Sandstone Cliffs, 10"-13" p.z., is a shrub dominated ecological site. Perennial grasses and forbs are sparse. Annual forbs and grasses flourish following rainfall. Natural disturbances are extremely rare. After introduction of non-native annuals (forbs and/or grasses), they flourish following wet winters.

## State and transition model

### Ecosystem states



### State 1 submodel, plant communities



## State 2 submodel, plant communities

2.1. Non-native  
Annuals

## State 1 Historic Climax Plant Community

### Community 1.1 Historic Climax Plant Community

The dominant aspect of this site is one of chaparral shrubs and scattered trees with an understory of perennial grasses and forbs. Common trees are gambel oak, Utah juniper and Colorado pinyon. Common shrubs include turbinella oak, yellow silktassel, Utah serviceberry, desert ceanothus and Wyoming big sagebrush. Cool season grasses are more common than warm season grasses. Muttongrass and prairie junegrass are the most common grass species. Spiny phlox and rock goldenrod are the most common forb species. In the absence of fire the plant community trends towards one with a substantial amount of pinyon and juniper trees, especially at higher elevations and cooler aspects. Immediately after burning the plant community will be dominated by annual grasses, forbs and half shrubs, including red brome and/or cheatgrass and broom snakeweed. Yerba santa will be one of the earliest shrub species to increase. Within 5 to 10 years chaparral shrub species, such as turbinella oak, desert ceanothus and manzanita, will begin to reestablish in substantial amounts. If not disturbed again the plant community will return to the former mix of trees, shrubs, forbs and grasses with trees again a major component in the cooler/wetter niches. If the site burns again before re-establishment of trees, especially if the occurrence of fire is frequent, the trees and less fire tolerant shrubs will be essentially removed from the plant community.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	716	896	1061
Tree	102	56	212
Grass/Grasslike	51	92	142
Forb	31	56	85
<b>Total</b>	<b>900</b>	<b>1100</b>	<b>1500</b>

Table 6. Ground cover

Tree foliar cover	2%
Shrub/vine/liana foliar cover	5%
Grass/grasslike foliar cover	1%
Forb foliar cover	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%

## 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 wild oat, red brome, Mediterranean grass (*Schismus* spp.), and filaree. The flourish of non-native annuals that occurs following rainfalls may preclude native annuals.

#### Transition T1A

##### State 1 to 2

Introduction of non-native annual forb and grass seed.

### Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Common Native Perennia Spring Grasses</b>			60–120	
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	24–48	–
	muttongrass	POFE	<i>Poa fendleriana</i>	24–48	–

	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	12–24	–
2	<b>Occasional Native Perennial Spring Grasses</b>			12–24	
	sedge	CAREX	<i>Carex</i>	0–12	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–12	–
3	<b>Occasional Native Perennial Summer Grasses</b>			0–12	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–12	–
<b>Forb</b>					
4	<b>Occasional Native Perennial Forbs</b>			36–72	
	rockcress	ARABI2	<i>Arabis</i>	0–12	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–12	–
	aster	ASTER	<i>Aster</i>	0–12	–
	mariposa lily	CALOC	<i>Calochortus</i>	0–12	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–12	–
	bastard toadflax	COMAN	<i>Comandra</i>	0–12	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–12	–
	sulphur-flower buckwheat	ERUM	<i>Eriogonum umbellatum</i>	0–12	–
	Munz's bedstraw	GAMU3	<i>Galium munzii</i>	0–12	–
	hymenaea	HYMEN	<i>Hymenaea</i>	0–12	–
	lupine	LUPIN	<i>Lupinus</i>	0–12	–
	Colorado four o'clock	MIMU	<i>Mirabilis multiflora</i>	0–12	–
	evening primrose	OENOT	<i>Oenothera</i>	0–12	–
	firecracker penstemon	PEEA	<i>Penstemon eatonii</i>	0–12	–
	toadflax penstemon	PELI2	<i>Penstemon linarioides</i>	0–12	–
	beardtongue	PENST	<i>Penstemon</i>	0–12	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0–12	–
	goldenrod	SOLID	<i>Solidago</i>	0–12	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	0–12	–
5	<b>Occasional Native Annual Forbs</b>			0–12	
	gilia	GILIA	<i>Gilia</i>	0–12	–
<b>Shrub/Vine</b>					
6	<b>Common Native Shrubs</b>			600–900	

	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	120–180	–
	desert ceanothus	CEGR	<i>Ceanothus greggii</i>	60–96	–
	ashy silktassel	GAFL2	<i>Garrya flavescens</i>	60–96	–
	Sonoran scrub oak	QUTU2	<i>Quercus turbinella</i>	60–96	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	60–96	–
	snowberry	SYMPH	<i>Symphoricarpos</i>	60–96	–
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	60–96	–
	manzanita	ARCTO3	<i>Arctostaphylos</i>	60–96	–
7	<b>Occasional Native Shrubs</b>			96–180	
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	24–60	–
	Stansbury cliffrose	PUST	<i>Purshia stansburiana</i>	24–60	–
	New Mexico locust	RONE	<i>Robinia neomexicana</i>	12–24	–
	mormon tea	EPVI	<i>Ephedra viridis</i>	0–12	–
	Eastern Mojave buckwheat	ERFA2	<i>Eriogonum fasciculatum</i>	0–12	–
	goldenbush	ERICA2	<i>Ericameria</i>	0–12	–
	sulphur-flower buckwheat	ERUM	<i>Eriogonum umbellatum</i>	0–12	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–12	–
	rough menodora	MESC	<i>Menodora scabra</i>	0–12	–
	beardtongue	PENST	<i>Penstemon</i>	0–12	–
8	<b>Occasional Native Cacti</b>			12–36	
	pricklypear	OPUNT	<i>Opuntia</i>	12–36	–
9	<b>Occasional Native Agave-Yucca-Likes</b>			12–36	
	agave	AGAVE	<i>Agave</i>	0–24	–
	banana yucca	YUBA	<i>Yucca baccata</i>	0–24	–
<b>Tree</b>					
10	<b>Occasional Native Trees</b>			120–180	
	velvet ash	FRVE2	<i>Fraxinus velutina</i>	24–36	–
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	24–36	–
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	24–36	–
	singleleaf pinyon	PIMO	<i>Pinus monophylla</i>	24–36	–
	Gambel oak	QUGA	<i>Quercus gambelii</i>	24–36	–

## Animal community

Steep slopes and dense woody vegetation found on this site in some areas limit accessibility to livestock.

This site is used extensively by wildlife, especially mule deer. Year-round browse is provided.

Potential wildlife species present include scrub jay, bushtit, long-eared owl, ash-throated flycatcher, rufous-sided towhee, American kestrel, mule deer, coyote woodrat, brush mouse, great basin pocket mouse, cottontail, gray fox, cougar, striped whipsnake, great basin rattlesnake.

## Recreational uses

Recreational uses include hunting, wildlife observation and hiking.

## Type locality

Location 1: Mohave County, AZ	
Township/Range/Section	T39 N. R15 W. S24
General legal description	Arizona, Mohave County, Mt. Bangs 7 1/2 min. quad. map, Sec. 24, T. 39 N., R. 15 W.

## 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	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

**1. Number and extent of rills:**

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**2. Presence of water flow patterns:**

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**3. Number and height of erosional pedestals or terracettes:**

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**4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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**5. Number of gullies and erosion associated with gullies:**

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**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):**
- 

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:**

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