

Ecological site R035XC331AZ

Shallow Upland

10-14" p.z.

Warm

Accessed: 05/04/2026

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): 035X–Colorado Plateau

AZ CRA 35.3 – Colorado Plateau Sagebrush – Grasslands Elevations range from 4800 to 6700 feet and precipitation averages 10 to 14 inches. The elevation range is lower (about 4500 to 6000) on the western edge of the Colorado Plateau along the Grand Canyon, and moves up about 500 to 800 feet higher on the eastern side in the areas of the Navajo and Hopi Indian Reservations due to rain shadow effects from the Kaibab Plateau and Mogollon Rim. Vegetation includes Wyoming big sagebrush, Utah juniper, Colorado pinyon - cliffrose, Mormon tea, fourwing saltbush, blackbrush Indian ricegrass, needle and thread, western wheatgrass Galleta, black grama, blue grama, and sand dropseed. The soil temperature regime is mesic and the soil moisture regime is ustic aridic. This unit occurs within the Colorado Plateau Physiographic Province and is characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Sedimentary rock classes dominate the plateau with volcanic fields occurring for the most part near its margin.

Table 1. Dominant plant species

Tree	(1) <i>Juniperus osteosperma</i>
Shrub	(1) <i>Coleogyne ramosissima</i>
Herbaceous	(1) <i>Pleuraphis jamesii</i> (2) <i>Achnatherum speciosum</i>

Physiographic features

This site is located in an upland position. It neither benefits from run-in, nor does it suffer from excessive runoff unless fire, drought or other disturbances remove the vegetative cover. Landform and position is on hills, plateaus, mesas and remnants of mesas and ridges.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Plateau (3) Mesa
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)

Flooding frequency	None to rare
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	None to rare
Elevation	1,460 – 2,040 m
Slope	0 – 30 %
Aspect	Aspect is not a significant factor

Climatic features

Winter summer moisture ratios range from 70:30 to 60:40. Late spring is usually the driest period, and early fall moisture can be sporadic. Summer rains fall from June through September; moisture originates in the Gulf of Mexico and creates convective, usually brief, intense thunderstorms. Cool season moisture from October through May tends to be frontal; it originates in the Pacific and the Gulf of California and falls in widespread storms with longer duration and lower intensity. Precipitation generally comes as snow from December through February. Accumulations above 12 inches are not common but can occur. Snow usually lasts for 3-4 days, but can persist much longer. Summer daytime temperatures are commonly 95 - 100 F and on occasion exceed 105 F. Winter air temperatures can regularly go below 10 F and have been recorded below - 20 F.

Table 3 Representative climatic features

Frost-free period (average)	170 days
Freeze-free period (average)	190 days
Precipitation total (average)	360 mm

Influencing water features

Soil moisture on this ecological site is from precipitation. This ecological site does not benefit significantly from run-in, nor does it suffer from excessive runoff unless fire, drought or other disturbances remove the vegetative cover. The shallow bedrock may concentrate moisture in the deeper soil pockets, increasing plant productivity in those areas.

Soil features

Soils are very shallow to shallow (20") over limestone and sandstone bedrock. Surface textures are very gravelly fine sandy loam to gravelly loam. Subsoil texture is very gravelly loam. Parent material is mixed alluvium, colluvium and eolian deposits from sedimentary formations, including limestone and sandstone. Available water capacity is very low. Water erosion potential is moderate to severe; wind erosion potential is very slight to slight. Soils are non-saline, non-sodic with a pH range of 7.4-8.4. Soil moisture regime is ustic aridic; soil temperature regime is mesic.

Soil Survey map unit components correlated to this ecological site include:

Shivwits Area (AZ623) Soil map unit components 18-Childers, 47-Mellenthin, 50-Mellenthin, 60-Childers, Pocum & Ubank, 76-Tassi;

Mohave County NE part (AZ625) Soil map unit components 36-Mellenthin;

Grand Canyon Area (AZ701) Soil map unit components 15-Calcic petrocalcids, 28-Meriwhitica;

Navajo Mountain Area (AZ711) Soil map unit components 25-Westmion, 38-Pocum family.

Table 4. Representative soil features

Parent material	(1) Alluvium – limestone and sandstone
Surface texture	(1) Very gravelly fine sandy loam (2) Gravelly loam (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate
Soil depth	10 – 50 cm
Surface fragment cover <=3"	0 – 20 %
Surface fragment cover >3"	20 – 40 %
Available water capacity (0-101.6cm)	0 – 6.35 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 30 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 8.4

Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

Ecological dynamics

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential plant communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as fire, grazing, or drought.

Production data provided in this site description is standardized to air dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine Similarity index, compare the production (air dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum amount shown for each group. Divide the resulting total by the total normal year production shown in the plant community description. If the rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

The State and Transition diagram below reflects the current understanding of ecological dynamics for the site and describes the most commonly occurring plant communities found on the site. This diagram may not contain all the possible states, transitions and plant communities at this time. However, as more data is collected, additional information can be incorporated to modify the diagram to describe previously unknown plant communities, states and pathways.

State and transition model

Figure 3. 35-3 Shallow Loamy Warm S&T

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Dominant Grasses			84-157	
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	22-56	–
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	17-34	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	11-22	–
	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	6-17	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	6-17	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	6-17	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	6-17	–
2	Other Perennial Grasses			6-22	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-11	–
	Mormon needlegrass	ACAR14	<i>Achnatherum aridum</i>	0-6	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0-6	–

	threeawn	ARIST	<i>Aristida</i>	0-6	-
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0-6	-
	black grama	BOER4	<i>Bouteloua eriopoda</i>	0-6	-
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	0-6	-
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0-6	-
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	0-4	-
	burrograss	SCBR2	<i>Scleropogon brevifolius</i>	0-4	-
	slim tridens	TRMU	<i>Tridens muticus</i>	0-4	-
	slim tridens	TRMUE	<i>Tridens muticus var. elongatus</i>	0-4	-
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	1-2	-
3	Annual Grasses			11-28	
	Grass, annual	2GA	<i>Grass, annual</i>	10-24	-
	red brome	BRRU2	<i>Bromus rubens</i>	0-10	-
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0-10	-
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0-10	-
Forb					
4	Dominant Perennial Forbs			11-22	
	globemallow	SPHAE	<i>Sphaeralcea</i>	11-22	-
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-4	-
5	Annual Forbs			0-17	
	Forb, annual	2FA	<i>Forb, annual</i>	0-11	-
	mustard	BRASS2	<i>Brassica</i>	0-11	-
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	4-10	-
6	Perennial Forbs			0-17	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-6	-
	winding mariposa lily	CAFL	<i>Calochortus flexuosus</i>	0-6	-
	bluedicks	DICAC5	<i>Dichelostemma capitatum ssp. capitatum</i>	0-6	-
	gilia	GILIA	<i>Gilia</i>	0-6	-
	Colorado four o'clock	MIMU	<i>Mirabilis multiflora</i>	0-6	-
	phlox	PHLOX	<i>Phlox</i>	0-6	-
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	2-4	-
Shrub/Vine					
7	Dominant Shrubs			224-392	
	blackbrush	CORA	<i>Coleogyne ramosissima</i>	224-308	-
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	11-28	-
	mormon tea	EPVI	<i>Ephedra viridis</i>	11-28	-
	banana yucca	YUBA	<i>Yucca baccata</i>	11-28	-
	Mexican cliffrose	PUME	<i>Purshia mexicana</i>	6-17	-
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	6-17	-
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	6-17	-
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	6-11	-
	Apache plume	FAPA	<i>Fallugia paradoxa</i>	6-11	-
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	6-11	-
8	Succulent Shrubs			6-22	
	blackbrush	CORA	<i>Coleogyne ramosissima</i>	163-235	-
	echinocactus	ECHIN2	<i>Echinocactus</i>	0-6	-

	kingcup cactus	ECTR	<i>Echinocereus triglochidiatus</i>	0-6	-
	globe cactus	MAMMI	<i>Mammillaria</i>	0-6	-
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0-6	-
	grizzlybear pricklypear	OPPOH	<i>Opuntia polyacantha var. hystricina</i>	0-6	-
	pricklypear	OPUNT	<i>Opuntia</i>	0-6	-
9	Other shrubs			6-17	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-6	-
	Torrey's jointfir	EPTO	<i>Ephedra torreyana</i>	0-6	-
	Eastern Mojave buckwheat	ERFAP	<i>Eriogonum fasciculatum var. polifolium</i>	0-6	-
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	0-6	-
	water jacket	LYAN	<i>Lycium andersonii</i>	0-6	-
	pale desert-thorn	LYPA	<i>Lycium pallidum</i>	0-6	-
	Fremont's mahonia	MAFR3	<i>Mahonia fremontii</i>	0-6	-
Tree					
10	Trees			0-4	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	0-4	-

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Animal community

This site is suitable for yearlong grazing by either cows and calves or stocker cattle but is not easily traversed by livestock because of the steep slopes and rough surface of cobbles and stones. Prescribed grazing systems can benefit this site by allowing rest periods for the cool season species. This site offers a fair diversity in the vegetative complex for wildlife. In higher condition classes the site is most suitable to grassland wildlife species. As retrogression occurs the woody species increase and wildlife species utilizing the site may change. Wildlife sometimes present are Mule deer, black-tailed jackrabbit, coyote, western rattlesnake, gopher snake, and antelope squirrel.

Recreational uses

Site is typically on hills, plateaus, mesas and ridges. It has rough surfaces which limit vehicles and animals. Winters are cold, however, relatively mild spring, fall and summer months are attractive to recreationists. Activities include hunting, photography, hiking, rock collecting, and wildlife observation.

Type locality

Location 1: Mohave County, AZ	
Township/Range/Section	T41N R10W S26
General legal description	Rock Canyon Quad; About 1 mile south of Cottonwood Canyon and 1/2 mile east of the Hurricane Cliffs; Section 26, T41N, R10W; Mohave County, AZ

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)	Dan Carroll
Contact for lead author	
Date	10/29/2010
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None would be expected until steeper slopes in conjunction with bare soil are encountered.

2. **Presence of water flow patterns:** Water flow patterns are evident where steeper slopes concentrate runoff. Generally, the shrub and grass mix and gravel in the soil surface horizon armor it from an abundance of water flow patterns.

3. **Number and height of erosional pedestals or terracettes:** There should not be pedestals present, but terracettes can form occasionally.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**
Bare ground is expected to be 50%

5. **Number of gullies and erosion associated with gullies:** None are expected on this site.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None expected.

7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter is moved by wind and water and the distance can be several feet or more in open areas. Woody litter tends to stay in place. Long lived perennial plants retain litter under the canopy.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** The soil surface is aided in it's resistance to erosion by gravel (avg. 20%) and biological crust (2% - 7%).

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface to 9" loamy fine sand that is single grain; loose. Notice: the soil survey for the area and map unit that is being observed should be referenced for accurate information regarding the unique characteristics of that soil.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Shallow slopes promote even plant distribution of a shrub/grassland mix and on steeper slopes the vegetation becomes more uneven. **Plant community composition:** Shrubs (10-20% canopy, 5-10% basal); Grasses (0-5% canopy, 0-2% basal); Forbs (0-3% canopy, 0-2% basal); Trees (0-1% canopy, 0-1% basal); Biological Crust (0-10%).

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None expected.

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: Shrubs

Sub-dominant: Grasses > Forbs

Other: Trees

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** The mortality of most shrubs, grasses, forbs and trees is < 10% except during prolonged, severe drought conditions. Short term winter drought affects trees and shrubs the most and short term summer drought affects forbs and grasses. Expect cyclical higher mortality on shorter lived grasses, shrubs and forbs, such as sand dropseed, squirreltail, broom snakeweed and globemallow.

14. **Average percent litter cover (%) and depth (in):** Most litter will accumulate below plant canopies or near plant bases.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Average annual production on this site is expected to be 350 to 450 lbs./ac. in a year of average annual precipitation.

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: Cheatgrass (*Bromus tectorum*) is commonly found in small amounts on the site (< 2 percent). During years of above average winter and spring moisture the composition of this may increase slightly. Severe disturbance may cause an increase in this or other invasive plants creating a potential for a shortened fire frequency on the site which could result in crossing a threshold to a state with increased introduced annual plants and fewer native shrubs.

17. Perennial plant reproductive capability: The only natural limitations to reproductive capability are weather related and natural disease or herbivory that reduces reproductive capability. All plants native to the site are adapted to the climate and are capable of producing seeds, stolons and rhizomes in all but the most severe droughts.
