USDA Natural Resources Conservation Service

Ecological site R035XG708AZ
Limestone Hills 14-18" p.z.

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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.

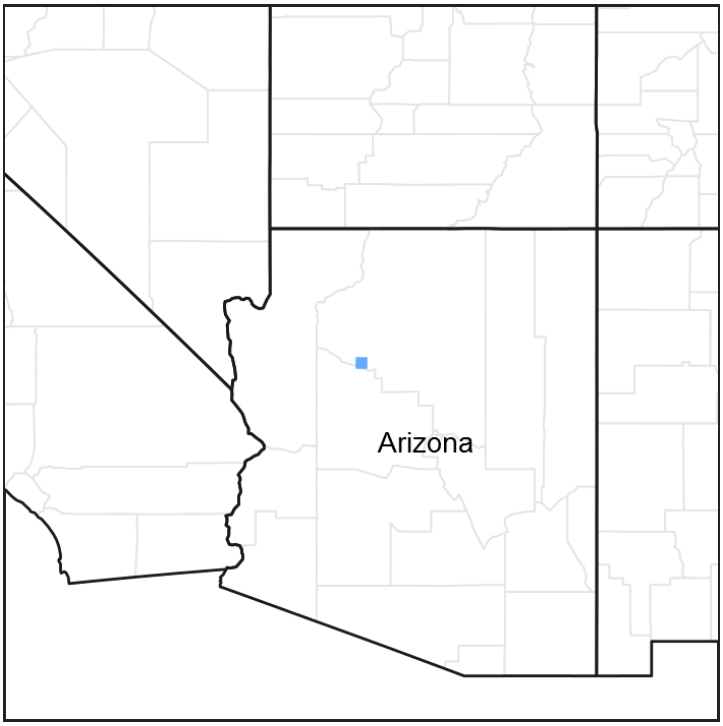

Figure 1. Mapped extent

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): 035X–Colorado Plateau

AZ CRA 35.7 – Colorado Plateau Woodland – Grassland

Elevations range from 5000 to 7000 feet and precipitation averages 14 to 18 inches per

year. Vegetation includes one-seed juniper, Colorado pinyon, Stansbury cliffrose, Apache plume, four-wing saltbush, green Mormon tea, needle and thread, sideoats grama, blue grama, black grama, galleta, bottlebrush squirreltail, and muttongrass. The soil temperature regime is mesic and the soil moisture regime is aridic ustic. 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	Not specified
Shrub	(1) *Purshia mexicana* (2) *Mahonia fremontii*
Herbaceous	(1) *Bouteloua curtipendula* (2) *Hesperostipa neomexicana*

Physiographic features

This site occurs on very low hills, plateaus and steep escarpments. Due to the shallow soils and very steep slopes, this site is subject to a significant amount of runoff. Slopes on the hills range from 30 to 80% while the canyon walls may be practically vertical.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Plateau (3) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	1,676–2,134 m
Slope	30–80%
Aspect	Aspect is not a significant factor

Climatic features

The climate of the land resource unit is semiarid with warm summers and cool winters. The mean annual precipitation ranges from 14 to 18 inches, but is very erratic, often varying substantially from year to year. The majority of the precipitation is received from October through April. This precipitation comes as gentle rain or snow from frontal storms coming out of the Pacific Ocean. Snow is common from November through February. Generally no more than a few inches of snow accumulates, melting within a few days, but may last a week or more. The remaining precipitation, approximately 40 percent, is

received from July through September as spotty, unreliable and sometimes violent thunderstorms. The moisture for this precipitation originates in the Gulf of Mexico (and the Pacific Ocean in the fall) and flows into the area on the north end of the Mexican monsoon. Late May through late June is generally a dry period. The mean annual temperature ranges from 46 to 52 degrees Fahrenheit (F). The frost-free period (air temperature > 32 degrees F) ranges from 108 to 151 days (@ 50 percent probability). Strong winds are common, especially in the spring.

Table 3. Representative climatic features

Frost-free period (average)	151 days
Freeze-free period (average)	170 days
Precipitation total (average)	457 mm

Influencing water features

Soil features

The soils of this site are well drained, very shallow and shallow to limestone bedrock. Surface textures are gravelly loam to very stony loam. The underlying layers are loam to clay loam. Gravel, cobbles and stones cover 10 to 70% of the soil surface and occupy 35 to 60% of the soil profile. These soils are fertile, and usually have good structure, and take in water readily. Their available water capacity is limited by soil depth. Fissures in the bedrock generally contain fine soil particles and store some moisture. Plant roots penetrate these cracks and crevices, and thus have access to more moisture and plant nutrients than are apparent in the soil. There is a severe erosion hazard when the soil is not properly protected by a good plant cover.

Typical taxonomic unit is;

SSA-631 Coconino County Central MU 54 Tovar;

SSA-707 Little Colorado River area MU 59 Suzmayne.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Very stony loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	13–51 cm

Surface fragment cover <=3"	20–40%
Surface fragment cover >3"	10–30%
Available water capacity (0-101.6cm)	2.54–6.35 cm
Calcium carbonate equivalent (0-101.6cm)	40–60%
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	10–40%
Subsurface fragment volume >3" (Depth not specified)	25–60%

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 grazing, fire, 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 shown for the group. Divide the resulting total by the total normal year production shown in the plant community description. If 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.

State and transition model

The State and Transition Model and Accompanying Narrative Descriptions are Still To Be Developed for this Ecological Site. For More Information Contact The Arizona NRCS State Rangeland Management Specialist.

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

The plant community is made up primarily of mid and short grasses with a large percentage of trees and shrubs. In the original plant community there is a mixture of both cool and warm season grasses. As retrogression occurs, brushy species increase until they dominate the site. Plant species most likely to invade or increase on this site when it deteriorates are broom snakeweed, annuals, rabbitbrush, and juniper. Continuous grazing during the winter and spring periods will decrease cool season species, which are replaced with lower forage value grasses and shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	291	346	401
Shrub/Vine	146	202	256
Tree	73	110	146
Forb	37	55	73
Total	**547**	**713**	**876**

Figure 5. Plant community growth curve (percent production by month). AZ3921, 35.7 14-18" p.z. all sites. Growth begins in the spring and continues through the summer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	14	21	17	18	14	8	3	0	0

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Tree					
0				73–146	
	oneseed juniper	JUMO	*Juniperus monosperma*	28–56	–
	Utah juniper	JUOS	*Juniperus osteosperma*	22–45	–
	twoneedle pinyon	PIED	*Pinus edulis*	22–45	–
Shrub/Vine					
0				95–331	
	Apache plume	FAPA	*Fallugia paradoxa*	8–39	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	8–39	–
	Mexican cliffrose	PUME	*Purshia mexicana*	11–39	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	8–39	–
	desert sweet	CHMI2	*Chamaebatiaria millefolium*	8–39	–
	jointfir	EPHED	*Ephedra*	8–39	–
	bastardsage	ERWR	*Eriogonum wrightii*	8–34	–
	Bigelow sage	ARBI3	*Artemisia bigelovii*	8–28	–
5				8–39	

	rabbitbrush	CHRYS9	*Chrysothamnus*	2–11	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	2–11	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	2–9	–
	threadleaf ragwort	SEFL3	*Senecio flaccidus*	2–6	–
6				45–95	
	Fremont's mahonia	MAFR3	*Mahonia fremontii*	39–73	–
	pale desert-thorn	LYPA	*Lycium pallidum*	11–22	–
Grass/Grasslike					
0				146–286	
	sideoats grama	BOCU	*Bouteloua curtipendula*	73–219	–
	blue grama	BOGR2	*Bouteloua gracilis*	39–112	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	39–73	–
1				39–185	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	22–101	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	17–84	–
2				56–224	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	8–39	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	8–39	–
	common wolfstail	LYPH	*Lycurus phleoides*	8–39	–
	James' galleta	PLJA	*Pleuraphis jamesii*	8–39	–
	muttongrass	POFEL	*Poa fendleriana ssp. longiligula*	8–39	–
	muttongrass	POFE	*Poa fendleriana*	8–22	–
	spike muhly	MUWR	*Muhlenbergia wrightii*	8–22	–
3				11–78	
	spike dropseed	SPCO4	*Sporobolus contractus*	2–22	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	2–19	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	2–19	–
	threeawn	ARIST	*Aristida*	2–17	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	2–17	–
Forb					

Forb					
4				39–73	
	globemallow	SPHAE	*Sphaeralcea*	8–20	–
	brickellbush	BRICK	*Brickellia*	6–17	–
	Forb, annual	2FA	*Forb, annual*	6–17	–
	Forb, perennial	2FP	*Forb, perennial*	8–17	–
	aster	ASTER	*Aster*	4–13	–

Animal community

On the less severe slopes, this site is suitable for light grazing during any season of the year by all types of livestock. As the soils are shallow and the slopes steep, grazing should be light in order to protect the native plant community and soils. Heavy use on this site could indicate that more accessible sites are badly abused. This site is very susceptible to erosion, when the native plant cover is removed. This site is usually associated with a canyon that has a riparian area in the bottom.

This site has excellent diversity in the plant community. The trees and shrubs found on the site provide wildlife with important winter cover and food. The pinyon and other winter browse components of the vegetative complex are expecially important for many species of wildlife. As this is a critical site for wildlife, any brush management should be very carefully planned.

Recreational uses

Since this site occurs on rolling hills and steep escarpments the primary recreational activity for this site is hunting.

The site is characterized by shrubs and scattered trees with an understory of grasses and forbs.

The climate is warm summers and cold winters with high winds often experienced during the winter and spring months.

Other activities include hiking, wildlife observation, photography and backpacking.

Other information

The golden eagle and prairie falcon may use this site for hunting.

Type locality

Location 1: Coconino County, AZ

Township/Range/Section	T32N R4W S15

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	
Approved by	
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):**

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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:**
