USDA Natural Resources
Conservation Service

Ecological site R035XD415AZ
Shallow Loamy 7-11" p.z.

Accessed: 12/18/2025

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.

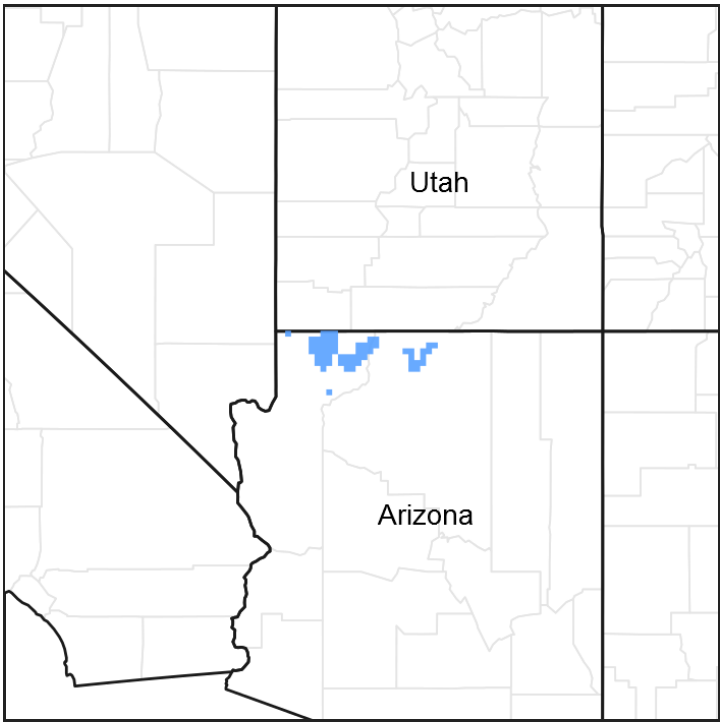

Figure 1. Mapped extent

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 35.4 – Colorado Plateau Cold Sagebrush – Grasslands

Elevations range from 4200 to 5100 feet and precipitation averages 7 to 11 inches.

Vegetation includes winterfat, fourwing saltbush, buckwheat species, needlegrass, bottlebrush squirreltail, Indian ricegrass, black grama, blue grama, sideoats grama, gyp dropseed, and galleta. The soil temperature regime is mesic and the soil moisture regime is typic 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	Not specified
Shrub	(1) *Atriplex canescens* (2) *Krascheninnikovia lanata*
Herbaceous	(1) *Achnatherum hymenoides* (2) *Hesperostipa comata ssp. comata*

Physiographic features

This site occurs in an upland position and does not benefit from excess run-in moisture from adjacent sites, nor does it suffer from excess runoff. This site occurs as undulating plains and rolling hills.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Plain
Flooding frequency	None to rare
Ponding frequency	None to rare
Elevation	3,800–5,300 ft
Slope	0–15%
Aspect	Aspect is not a significant factor

Climatic features

Winter-Summer moisture ratios are typically 70:30 on the west side of this LRU and shift to 60:40 on the east side. Late spring is usually the driest period, and early fall moisture can be sporadic. Summer rains fall June-September; moisture originates in the Gulf of Mexico and creates convective, usually brief, intense thunderstorms. Cool season moisture October-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 December-February. Accumulations above 10 inches are not common, but can occur. Snow usually lasts 3-4 days, but can persist much longer. Summer daytime temperatures are commonly 95-100 F and, on occasion, exceed

105F. Winter air temperatures can regularly go below 15 F and have been recorded below -15 F.

Table 3. Representative climatic features

Frost-free period (average)	220 days
Freeze-free period (average)	150 days
Precipitation total (average)	11 in

Influencing water features

Soil features

Soil depth ranges from very shallow to shallow to limestone or calcareous sandstone bedrock. The surface textures include a gravelly sandy loam, loamy sand, very gravelly loam, fine sandy loam to loam. Subsurface textures range include clay loam, sandy loam, gravelly loam to fine sandy loam. Salt accumulations are low. Rock outcrop is common, usually in the form of bedrock. Rocks and/or gravel may be found throughout the soil but are less than 30% by volume. These soils occur primarily on calcareous sandstone.

Some taxonomic units are:

SSA623 Shivwits Area - MU 54 Moenkopie, MU 55 Moenkopie & Pennell;
SSA625 Mohave County NE part - MU 24, 46 & 47 Pennell;
SSA629 Coconino County North Kaibab part - MU 7 & 12 Curob, 27 Monierco and 34 Pennell.

Table 4. Representative soil features

Parent material	(1) Colluvium–calcareous sandstone (2) Residuum–limestone
Surface texture	(1) Gravelly sandy loam (2) Very gravelly loam (3) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	5–20 in
Surface fragment cover <=3"	0–35%
Available water capacity (0-40in)	2.5–5 in

Calcium carbonate equivalent (0-40in)	15–40%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	7.8–8.9

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

This site is a grassland consisting of short and mid grasses and interspersed with shrubs. In the potential plant community there is a mixture of both cool and warm season grasses. Species most likely to increase following disturbances are goldenweed, wolfberry, and threeawn. Cheatgrass and russian thistle may invade.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	455	504	550
Shrub/Vine	65	98	130
Forb	7	20	35
Total	**527**	**622**	**715**

Figure 5. Plant community growth curve (percent production by month). AZ0004, 35.4 7-11" p.z. fourwing saltbush. Some growth in spring, most growth in summer to early fall rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	10	15	30	40	5	0	0	0

Figure 6. Plant community growth curve (percent production by month). AZ0005, 35.4 7-11" p.z. Indian ricegrass. Most growth occurs in the spring, some growth occurs in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	10	40	40	0	0	0	5	5	0	0

Figure 7. Plant community growth curve (percent production by month). AZ3541, 35.4 7-11" p.z. all sites. Most growth occurs in the spring and during the summer rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	9	20	15	5	16	25	6	2	1	0

Figure 8. Plant community growth curve (percent production by month). AZ3542, 35.4 7-11" p.z. Needle and thread. Growth occurs mostly in the spring..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	15	60	20	5	0	0	0	0	0	0

Figure 9. Plant community growth curve (percent production by month). AZ3562, 35.4 7-11" p.z. bottlebrush squirreltail. Most growth occurs in the spring, plants may remain green during the winter..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	5	30	35	15	5	0	0	0	5	5	0

Figure 10. Plant community growth curve (percent production by month). AZ0001, 35.4 7-11. Growth begins in the spring, most growth occurs during the summer rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	3	15	5	25	40	10	2	0	0

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0				60–100	
	fourwing saltbush	ATCA2	*Atriplex canescens*	26–52	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	20–33	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	20–33	–
2				5–30	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	7–46	–
	desert-thorn	LYCIU	*Lycium*	7–46	–
	slender goldenweed	MAGR10	*Machaeranthera gracilis*	7–46	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	2–25	–
Grass/Grasslike					
0				400–450	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	65–130	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	52–104	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	52–104	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	33–65	–
	spike dropseed	SPCO4	*Sporobolus contractus*	20–46	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	13–33	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	13–33	–
	threeawn	ARIST	*Aristida*	7–20	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	0–20	–
1				75–150	
	James' galleta	PLJA	*Pleuraphis jamesii*	33–98	–

	James' galleta	PLJA	*Pleuraphis jamesii*	39–59	
	blue grama	BOGR2	*Bouteloua gracilis*	26–52	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	20–39	–
	black grama	BOER4	*Bouteloua eriopoda*	20–39	–
	burrograss	SCBR2	*Scleropogon brevifolius*	0–20	–
Forb					
0				7–35	
	Forb, annual	2FA	*Forb, annual*	7–33	–
	Forb, perennial	2FP	*Forb, perennial*	7–33	–
	globemallow	SPHAE	*Sphaeralcea*	7–33	–

Animal community

This site will respond well to management even though soils are often very shallow. They are slow to respond from a deteriorated condition even with good management.

Cover and diversity for wildlife are fair. This site is suited for open plains wildlife species. Permanent waters are lacking.

Recreational uses

This site occurs as undulating plains and rolling hills. The vegetation is a grassland with outcrops of bedrock and a few interspersed shrubs.

The winters are cold and summers are very warm. Spring and fall are the dry seasons and are usually cool and windy.

Recreational activities most likely to occur are hunting, cross-country riding, photography and wildlife observation.

Other information

Threatened and Endangered Species: Golden eagles and Prairie falcons occasionally use the site for feeding areas.

Type locality

Location 1: Coconino County, AZ	
Township/Range/Section	T37N R4E S15
General legal description	In Coconino County about 19 miles southwest of Marble Canyon; Section 15, T37N, R4E.

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)	Steve Cassady, Kyle Spencer, Tobiah Salvail
Contact for lead author	Steve Cassady
Date	04/29/2008
Approved by	S. Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

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2. **Presence of water flow patterns:** None

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3. **Number and height of erosional pedestals or terracettes:** No pedestals, but turf building is common under larger/older shrubs.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is < or = 50 percent.

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5. **Number of gullies and erosion associated with gullies:** None

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

7. **Amount of litter movement (describe size and distance expected to travel):** Litter does not move except during the largest storm events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** The soil surface develops a thin cap that is resistant to erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface of soils associated with this site are moderate thin platy; slightly hard, very friable. Color is light brown (7.5YR 6/4) dry, dark brown (7.5YR 4/4) moist.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Randomly scattered plants consisting of about 80 percent grasses, 15 percent shrubs and 5 percent forbs promote infiltration and reduce runoff. The average distance to the nearest perennial plant (fetch) is 13 inches, with the majority ranging from 4 to 18 inches, but occasionally as far as 30 inches.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer.

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: Grasses (70 to 85%) >> Shrubs (10 to 20%) > Forbs (1 to 5%).

    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):** In “normal” precipitation years mortality should be no more than 10 percent. During periods of drought mortality may be much higher, especially on half-shrubs; fourwing saltbush (Atriplex canescens) may loose individual branches; severe dieback of threeawn (Aristida sp.) and galleta (Pleuraphis jamesii) may occur.

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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):** Average annual production on this site is expected to be 600 to 700 lbs/ac. in a year of average annual precipitation

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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:** Russian thistle (Salsola kali) and cheatgrass (Bromus tectorum) are commonly found in small amounts on the site (< 2 percent). During years of above average winter and spring moisture the composition of these may increase slightly. Severe disturbance may cause an increase in one or all of these 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.

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17. **Perennial plant reproductive capability:** All plants native to this site are adapted to the climate and are capable of producing seeds, stolons, and/or rhizomes except during the most severe droughts.
