

Ecological site R035XB234AZ  
Sandstone Upland 6-10" p.z. Warm

Accessed: 05/10/2024

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.

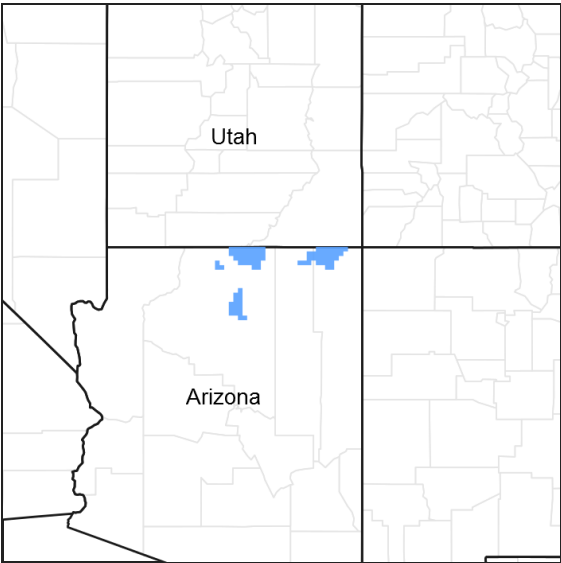


Figure 1. Mapped extent

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

This ecological site occurs in Common Resource Area 35.2 - the Colorado Plateau Shrub – Grasslands

Elevations range from 3800-5800 feet and precipitation averages 6 to 10 inches per year. Vegetation includes shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. 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) <i>Coleogyne ramosissima</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i> (2) <i>Pleuraphis jamesii</i>

Physiographic features

This site is on shallow soils found on mesas and structural benches of undulating plateaus. Slopes range from 0-15% slopes.

**Table 2. Representative physiographic features**

Landforms	(1) Mesa (2) Plateau
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)
Ponding frequency	None to rare
Elevation	1,158–1,768 m
Slope	0–15%
Aspect	Aspect is not a significant factor

## Climatic features

The 35.2 Colorado Plateau Cold Desert Shrub - Grassland common resource area has a very dry and windy climate that is hot in the summer and cold in the winter. The annual precipitation averages between 6 and 10 inches. The soil moisture regime is typic aridic and the soil temperature regime is mesic. A slight majority of the precipitation arrives during the late fall, winter, and early spring. This winter season moisture originates in the Pacific Ocean and arrives as rain, or sometimes snow, during widespread frontal storms of generally low intensity. The majority of the snow (average range of 1 to 17 inches) falls from December through February, but rarely lasts more than a few days. A seasonal drought occurs from late May through early July. Summer rains occur from July through September during brief intense local thunderstorms. The rain is sporadic in intensity and location. The moisture originates from the Gulf of Mexico in the early summer and the Gulf of California in the late summer/early fall. Windy conditions are common year round, but the winds are strongest and most frequent during the spring.

**Table 3. Representative climatic features**

Frost-free period (average)	181 days
Freeze-free period (average)	207 days
Precipitation total (average)	254 mm

## Influencing water features

The soil moisture on this ecological site comes from precipitation. The site does not benefit significantly from run-on moisture. Shallow bedrock areas will concentrate water in deeper soil pockets, increasing production in those areas. Because of the shallow soils, larger rainfall events will not be entirely captured by the site. This site contributes runoff to other ecological sites.

## Soil features

Soils on this site are shallow. Surface textures are loamy sand to sand. They formed from eolian materials and residuum from sandstone and limestone. Subsurface textures are fine sandy loam, gravelly sandy loam, gravelly loam, gravelly loamy fine sand, extremely gravelly fine sandy loam.

Typical taxonomic units include:

SSA 629 Coconino County North part - MU's 33, 49, & 50 Wahweap;  
SSA 707 Little Colorado River Valley Area - MU's 24 Hoskinnini;  
SSA 711 Navajo Mountain Area MU's 31 Needle, 45 Lithic Torriorthents, 59 & 63 Typic Torriorthents;

SSA 717 Shiprock NM - MU 522 Pennell and  
SSA UT689 Glen Canyon, Utah MU's 7 Farb, Tsaya family; 42 Tsaya & Nepalto and 43 Needle.

**Table 4. Representative soil features**

Parent material	(1) Eolian deposits–limestone and sandstone
Surface texture	(1) Loamy fine sand (2) Fine sand
Family particle size	(1) Loamy
Drainage class	Somewhat excessively drained to excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	25–51 cm
Surface fragment cover <=3"	0%
Available water capacity (0-101.6cm)	0–6.35 cm
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–25%

## 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.

The State and Transition model shows the most common occurring plant communities likely to be encountered on this ecological site. This model may not show every possible plant community, but only those that are most prevalent and observed through field inventory. As more data is collected these plant communities may be revised, removed, and some added to reflect the ecological dynamics of this site.

## State and transition model

## 35.2AZ Sandstone Upland 6-10" p.z. Warm (R035XB234AZ)

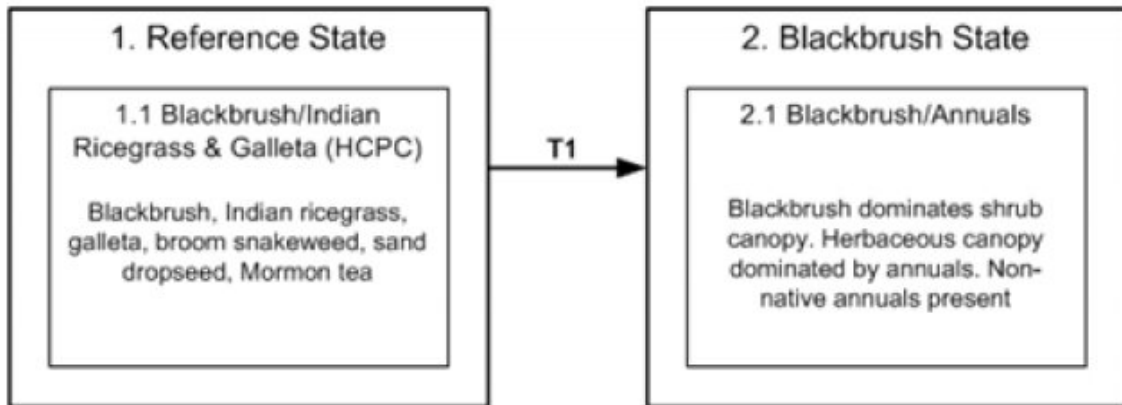


Figure 4. State and Transition Model - R035XB234AZ

### State 1 Reference State

This state includes the Historic Climax Plant Community which is a shrubland community dominated by blackbrush mixed with warm and cool season grasses.

### Community 1.1 Blackbrush/ Indian ricegrass - Galleta

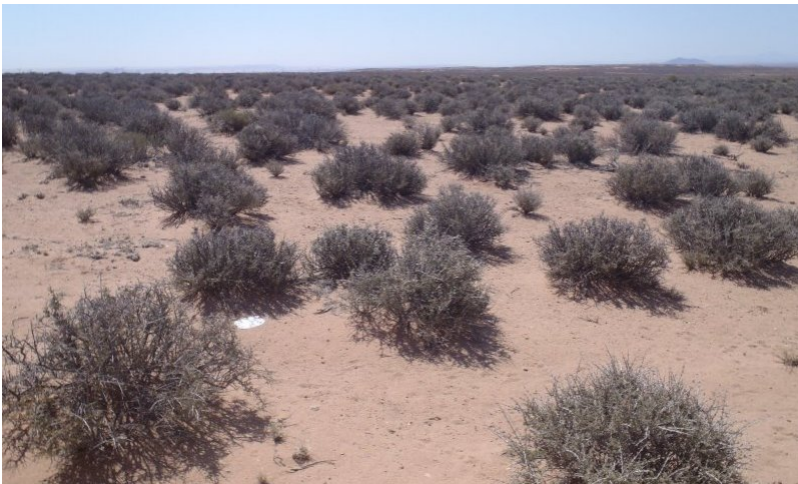


Figure 5. Sandstone Upland 6-10" p.z. Warm



Figure 6. Sandstone Upland 6-10" p.z. Warm

This site is a blackbrush dominated community mixed with cool and warm season grasses like Indian ricegrass and galleta and a few forbs. Plant species most likely to invade or increase on this site when it deteriorates are blackbrush, cacti, and annuals. Unmanaged grazing during the winter and spring periods will decrease the cool season grasses, which are replaced by 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)
Shrub/Vine	168	252	336
Grass/Grasslike	56	84	112
Forb	6	11	17
<b>Total</b>	<b>230</b>	<b>347</b>	<b>465</b>

**Table 6. Ground cover**

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-15%
Grass/grasslike foliar cover	0-5%
Forb foliar cover	0-1%
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%

**Table 7. Soil surface cover**

Tree basal cover	0%
Shrub/vine/liana basal cover	5-10%
Grass/grasslike basal cover	1-2%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	0-15%
Litter	5-10%
Surface fragments >0.25" and <=3"	0-10%
Surface fragments >3"	0-5%
Bedrock	0-5%
Water	0%
Bare ground	50-75%

**Table 8. Canopy structure (% cover)**

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	—	—	0-3%	0-1%
>0.15 <= 0.3	—	0-5%	0-3%	0-1%
>0.3 <= 0.6	—	0-10%	—	—
>0.6 <= 1.4	—	—	—	—
>1.4 <= 4	—	—	—	—
>4 <= 12	—	—	—	—
>12 <= 24	—	—	—	—
>24 <= 37	—	—	—	—
>37	—	—	—	—

Figure 8. Plant community growth curve (percent production by month). AZ3521, 35.2 6-10" p.z. all sites. Growth begins in the spring and continues through the summer. Most growth in this CRA occurs in the spring using stored winter moisture..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	9	20	27	14	10	11	5	3	0	0

Figure 9. Plant community growth curve (percent production by month). AZ5201, 35.2 6-10" p.z. galleta. Growth begins in spring, most growth occurs during summer rains..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	10	15	35	5	0	0	0

Figure 10. Plant community growth curve (percent production by month). AZ5202, Indian ricegrass, 35.2 6-10" p.z.. Growth begins in spring, most growth occurs in May, goes dormant during summer heat..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	10	15	40	20	0	0	10	5	0	0

Figure 11. Plant community growth curve (percent production by month). AZ5206, 35.2 6-10" p.z. blackbrush. Most growth occurs in the spring, goes dormant during the summer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	10	20	50	20	0	0	0	0	0	0

## State 2

### Blackbrush State

This plant community is dominated by blackbrush with an understory of native and non-native annuals and sparse perennial grasses.

### Community 2.1

#### Blackbrush/Annuals

This plant community is dominated by blackbrush with a understory of sparse perennial grasses and annuals. Native and non-native annuals have increased and are co-dominate with perennial grasses. Common annuals are Russian thistle cheatgrass and/or red brome.

### Transition T1

#### State 1 to 2

Introduction of non-native annuals, unmanaged grazing, drought, lack of fire.

## Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Grasses</b>			56–123	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	34–50	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	17–34	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	3–17	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–17	–
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	0–17	–
	sandhill muhly	MUPU2	<i>Muhlenbergia pungens</i>	0–6	–
<b>Forb</b>					
2	<b>Forbs</b>			6–17	
	Forb, annual	2FA	<i>Forb, annual</i>	0–11	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–11	–
<b>Shrub/Vine</b>					
3	<b>Shrubs</b>			168–342	
	blackbrush	CORA	<i>Coleogyne ramosissima</i>	168–213	–
	Cutler's jointfir	EPCU	<i>Ephedra cutleri</i>	0–28	–
	Torrey's jointfir	EPTO	<i>Ephedra torreyana</i>	0–28	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	3–28	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–17	–
	sand buckwheat	ERLE9	<i>Eriogonum leptoclodon</i>	0–17	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	3–17	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0–6	–
	narrowleaf yucca	YUAN2	<i>Yucca angustissima</i>	0–6	–

## Animal community

This site is favorable for grazing throughout most of the year by all classes of livestock except when snow cover restricts availability of forage. Planned grazing systems needed to encourage cool season grass species which are beneficial to antelope, cottontails and rodents. Shrubs that provide both food and cover should be maintained.

Wildlife diversity on this site is quite limited due to constancy of topography and vegetative form and ephemeral waters. This site does provide a significant forage substrate for adapted species.

## Recreational uses

Site is located on gently sloping benches and mesa tops which lend themselves to activities such as horseback riding, wildlife observation, photography and hiking.

## Type locality

Location 1: Apache County, AZ	
Township/Range/Section	T40N R25E S14

General legal description	Mexican Water Quad; Four miles southwest of Mexican Water Trading Post, on top of Little Mesa east of US191, Section 14, T40N, R25E, Navajo Indian Reservation, AZ.
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## Other references

Updates and revisions for this ESD were conducted as part of a 2007-2012 Interagency Technical Assistance Agreement between the Bureau of Indian Affairs–Navajo Region and the NRCS-Arizona.

## 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)	Kenneth Gishi
Contact for lead author	NRCS State Rangeland Management Specialist - Phoenix, AZ
Date	08/02/2012
Approved by	Byron Lambeth
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- Number and extent of rills:** None expected. However, temporary rills may form after large, intense storm events; especially when the site is below or adjacent to rock outcrops.  

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- Presence of water flow patterns:** None expected due to the soils being well-drained and able to accept most, if not all the moisture that falls on them.  

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- Number and height of erosional pedestals or terracettes:** No significant development of pedestals. These soils may show signs of mounding around large shrubs from wind deposition, not from water erosion.  

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- Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 50 to 75 percent.  

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- Number of gullies and erosion associated with gullies:** None  

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6. **Extent of wind scoured, blowouts and/or depositional areas:** There should be no active wind scour or blowouts. There may be slight deposition at the base of shrubs.
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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter may move short distances (less than 3 feet) away from plant bases. Woody litter should remain beneath plant canopies.
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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):** Surface textures range from sand to loamy fine sand. Soil site stability is expected to range from 1-2 in the interspaces and range from 3-4 under plant canopies.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface horizon is typically at least 2 inches deep. Structure is typically weak (thin to medium) platy structure or weak fine granular. Color is typically yellowish red (5YR 5/6), but can vary depending on source parent material.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site is characterized by a dominate canopy of shrubs with scattered herbaceous plants. The presence of plant canopy (20 – 40%) and biological soil crust aid in reducing runoff and improving infiltration. When well vegetated and sufficiently covered with biological soil crust and litter this site is moderately effective at capturing precipitation.
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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):** None, but bedrock occurs between 10-20 inches of the surface.
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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: Blackbrush >>
- Sub-dominant: Cool season grasses > warm season grasses >= succulents > half-shrubs >
- Other: Forbs > Cacti > annual grasses
- Additional:
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All plant functional groups are adapted to survive in all except during the most severe droughts. Severe winter droughts affect shrubs and cool season grasses the most. Severe summer droughts affect warm season grasses the most. During prolong droughts blackbrush will drop its leaves to conserve plant moisture.
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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 250 – 350 lbs/ac in a year of normal 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: Blackbrush and broom snakeweed are all native to the site but have the potential to increase and dominate the site. Cheatgrass, redbrome, filaree and Russian thistle are non-natives that have the potential to invade.
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17. **Perennial plant reproductive capability:** All plants native to the site are adapted to the climate and are capable of producing seeds, stolons, and/or rhizomes except during the most severe droughts.
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