

Ecological site R035XB228AZ Sandstone Upland 6-10" p.z. Sodic

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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.

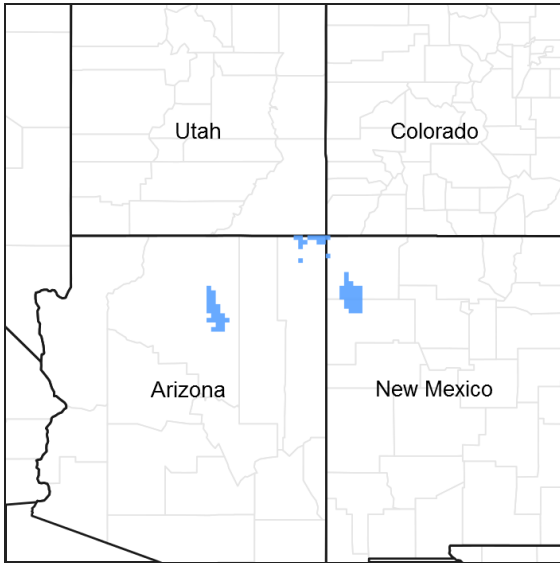


Figure 1. Mapped extent

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

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>Atriplex obovata</i> (2) <i>Atriplex confertifolia</i>
Herbaceous	(1) <i>Sporobolus airoides</i> (2) <i>Pleuraphis jamesii</i>

Physiographic features

Soils on this site formed in alluvium and residuum derived from sandstone on footslopes and structural benches of valley sides.

Table 2. Representative physiographic features

Landforms	(1) Structural bench
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	Rare to occasional
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	None to rare
Elevation	1,158–1,768 m
Slope	1–15%
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 typical 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

None

Soil features

Soil series on this site consist of well drained, sodic soils which are shallow to sandstone.

Typical taxonomic units include:

SSA-707 Little Colorado River Area MU's 56 & 57 Shorthair, 56 Moenkopie;
SSA-715 Fort Defiance Area AZ/NM MU's 33 Huerfano, 135 Werito;
SSA 717 Shiprock Area AZ/NM - MU's 100 Werito, 110 & 255 Benally, 122 Blueflat, 145 & 180 Huerfano, & 505 Shorthair.

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale
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Surface texture	(1) Gravelly loamy fine sand (2) Gravelly fine sand (3) Channery fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	25–51 cm
Surface fragment cover <=3"	15–20%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	2.54–5.08 cm
Calcium carbonate equivalent (0-101.6cm)	5–10%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	5–13
Soil reaction (1:1 water) (0-101.6cm)	7.8–9.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%

Ecological dynamics

An ecological site is not a precise assemblage of species for which the proportions are the same from place to place or from year to year. In all plant communities, variability is apparent in productivity and occurrence of individual species. Spatial boundaries of the communities; however, can be recognized by characteristic patterns of species composition, association, and community structure. The historic climax plant community for this ecological site has been described by sampling relict or relatively undisturbed sites and/or reviewing historic records. The historic climax plant community is the plant community that evolved over time with the soil forming process and long term changes in climatic conditions of the area. It is the plant community that was best adapted to the unique combination of environmental factors associated with the site.

Natural disturbances, such as drought, fire, grazing of native fauna, and insects, are inherent in the development and maintenance of these plant communities. The effects of these disturbances are part of the range of characteristics of the ecological site. Fluctuations in plant community structure and function caused by the effects of natural disturbances help establish the boundaries and characteristics of an ecological site. They are accounted for as part of the range of characteristics of the ecological site. Recognizable plant community phases are identified in the reference state of the ecological site. Some sites may have a small range of variation, while others have a large range. Some plant community phases may exist for long periods of time, while others may only occur for a couple of years after a disturbance.

Deterioration of the plant community, hydrology, or soil site stability on an ecological site can result in crossing a threshold or potentially irreversible boundary to another state, or equilibrium. This can occur as a result of the loss of soil surface through erosion, the loss of the stability of the site due to disturbances that cause active erosion on the site, increases in the amounts and/or patterns or runoff from rainstorms, changes in availability of surface and subsurface water, significant changes in plant structural and functional types, or the introduction of non-native species. When these thresholds are crossed, the potential of the ecological site to return to the historic climax plant community can be lost, or restoration will require significant inputs. There may be multiple states possible for an ecological site, determined by the type and or severity of disturbance.

The known states and transition pathways for this ecological site are described in the state and transition model. Within each state, there may be one or more known plant community phases. These community phases describe the different plant community that can be recognized and mapped across this ecological site. The state and

transition model is intended to help land users recognize the current plant community on the ecological site, and the management options for improving the plant community to the desired plant community.

Plant production information in this site description is standardized to the annual production on an air-dry weight basis in near normal rainfall years.

State and transition model

35.2AZ Sandstone Upland 6-10" p.z. Sodic (R035XB228AZ)

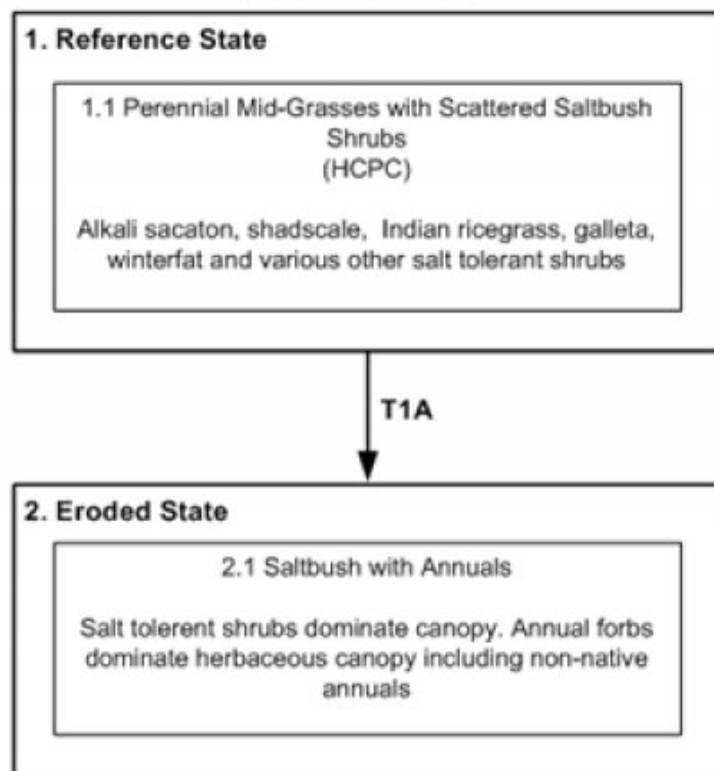


Figure 4. State and Transition Model - R035XB228AZ

State 1

Reference State

Community 1.1

Perennial Grasses and Scattered Saltbush Shrubs (HCPC)



Figure 5. Loamy Upland, Sodic - Higher elevation/Moderately Grazed



Figure 6. Loamy Upland, Sodic - Low elevation site

This plant community is made up primarily of mid and short grasses with a moderate amount of shrubs and relatively small percentage of forbs. In the original plant community there is a mixture of both cool and warm season grasses. Plant species most likely to invade or increase on this site when it deteriorates are cheatgrass, broom snakeweed, annuals, cacti, shadscale, mound saltbush and black greasewood. Continuous grazing during the winter and spring periods will decrease the cool season grasses, which are replaced by warm season, lower forage value grasses and shrubs. The dominance of shadscale and mound saltbush may vary between sites depending on degree of salinity and sodicity. Sites that are more saline-sodic will favor shadscale and site with higher sodicity favors mound saltbush.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	78	131	185
Shrub/Vine	50	84	118
Forb	6	9	11
Total	134	224	314

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-3%
Grass/grasslike basal cover	1-4%
Forb basal cover	1-2%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-10%
Surface fragments >0.25" and <=3"	5-35%
Surface fragments >3"	0-15%
Bedrock	0-10%
Water	0%
Bare ground	30-50%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-1%	0-2%	0-2%
>0.15 <= 0.3	–	0-5%	0-5%	0-1%
>0.3 <= 0.6	–	0-1%	0-5%	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 8. Plant community growth curve (percent production by month). AZ3509, 35.3 10-14" p.z. shadscale saltbush. Growth begins in spring and extends through the summer. Seed set occurs in summer to early fall..

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

Figure 9. 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 10. 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 11. Plant community growth curve (percent production by month). AZ5203, 35.2 6-10" p.z. alkali sacaton. Growth begins in the spring, most growth occurs in the summer, goes dormant in the fall..

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

Figure 12. Plant community growth curve (percent production by month). AZ5210, 35.2 6-10" p.z. mound saltbush. Growth begins in spring and continues through the summer. Seed stalk extension occurs in late summer with seed set in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	20	25	15	15	10	5	5	0	0

State 2 Eroded State

This plant community is characterized by a increase of mound saltbush and some forbs. As the surface is reduced of perennial plant cover the site tend to become more sodic. This favors the increase of mound saltbush and decline of galleta, alkali sacaton and shadscale.

Transition T1A

State 1 to 2

Continuous heavy grazing/improper grazing management, drought, establishment of native and non-native annuals. Loss of perennial herbaceous cover leads to increased bare ground and decrease of surface resistance to wind/water erosion. This allows for increased rills, sheet flow and wind erosion.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Grasses			78–185	
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	56–67	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	34–45	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–22	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–11	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	2–11	–
	Fendler's threeawn	ARPUF	<i>Aristida purpurea var. fendleriana</i>	0–11	–
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	0–11	–
	Grass, annual	2GA	<i>Grass, annual</i>	0–6	–
Forb					
2	Forbs			2–11	
	Forb, perennial	2FP	<i>Forb, perennial</i>	2–7	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–4	–
	Fendler's springparsley	CYACF	<i>Cymopterus acaulis var. fendleri</i>	0–2	–
	Forb, annual	2FA	<i>Forb, annual</i>	0–2	–
Shrub/Vine					
3	Shrubs			50–118	
	mound saltbush	ATOB	<i>Atriplex obovata</i>	22–45	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	11–34	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–11	–
	Drummond's goldenbush	ISDR	<i>Isocoma drummondii</i>	2–11	–
	Greene's rabbitbrush	CHGR6	<i>Chrysothamnus greenei</i>	0–7	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–7	–
	greasewood	SAVE4	<i>Sarcobatus vermiculatus</i>	0–4	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0–2	–

Animal community

This site is suitable for yearlong grazing by either cows and calves or stocker cattle. Prescribed grazing systems can be applied when this site is involved. When deteriorated this site responds rather slowly to good management.

The potential plant community provides a variety of food and cover plants for wildlife. Water can be scarce in natural springs or pockets. The topography provides escape habitat.

Recreational uses

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

This site has a variety of spring and summer flowers which are particularly noticeable after good moisture periods. It has good aesthetic appeal when not severely disturbed.

Winters are cold, however, relatively mild spring, fall and summer months are attractive to recreationists.

Type locality

Location 1: Apache County, AZ	
Township/Range/Section	T41N R30E S15
General legal description	Teec Nos Pos Quad; northeast quarter of section 15, T41N, R30E. Three miles northwest of Teec Nos Pos on the Navajo Indian Reservation, AZ.

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	State Rangeland Management Specialist, NRCS-Arizona State Office
Date	08/03/2012
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- Number and extent of rills:** A few rills may occur on this site and should be less than 15 feet in length. On steeper slopes, rills may increase in length and numbers. There may be an increase in rills following large storm events.

- Presence of water flow patterns:** The water flow patterns are widely spaced and uniform, the average length is 10-20 feet long with up to 10% coverage across the site. Flow paths should be less than 12 inches wide. Where present the flow paths should be somewhat sinuous and winding around plant bases and rock fragments.

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3. **Number and height of erosional pedestals or terracettes:** Only very few low terracettes along water flow patterns. There is some slight mounding (less than 1 inch) around long-lived perennial grasses and shrubs. There can be some slight pedestalling along or near water flow patterns. There should be no exposed roots on herbaceous plants and rarely on 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 range from 30-50 percent.
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5. **Number of gullies and erosion associated with gullies:** None to rare, but can occur where adjacent sandstone breaks and rock outcrops that can concentrate on-site water flow. When present, gullies should be very shallow and show only minor signs of active erosion and stabilized with perennial vegetation and/or rock fragments.
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6. **Extent of wind scoured, blowouts and/or depositional areas:** None expected, due to loamy textures and amount of rock cover on surface. There is some slight mounding occurring around the bases of shrubs.
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7. **Amount of litter movement (describe size and distance expected to travel):** The majority of the fine herbaceous litter (<1/8") are moved by wind and water in flow paths, and only woody litter remains and accumulate under the shrubs.
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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):** Soil stability with canopy ranges from 4 to 5 and with no canopy ranges from 2 to 3 in the interspaces.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is moderate (weak, thick) platy structure parting to weak fine granular, the color is typically light reddish brown-5YR 6/4, and surface thickness ranges from 2 to 3 inches. Color can vary depending on parent material. Additional soil information can be accessed through the soil survey report for the soil you are evaluating.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The site is dominated by grasses and makes up the majority of the plant composition (60%) and along with rock fragments help reduce splash erosion and slow runoff. However, the lack of good herbaceous perennial cover and moderate bare ground cover limits the sites ability to effectively capture and hold 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):** None. Some soils may have a natric horizon within 8 inches of the surface or platy structure and should not be confused with compaction layers.
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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: Warm season grasses (alkali sacaton, galleta, sand dropseed) > Low shrubs (Shadscale, mound saltbush, broom snakeweed, Jimmyweed) >>

Sub-dominant: Cool season grasses (Indian ricegrass, squirreltail, threeawn) > forbs >

Other: Annual grasses = Cacti

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Prolonged droughts can affect shrubs and cool season grasses especially if there are insufficient winter moisture. On this site, there is a 5-10% decadence in shrubs and succulents species.
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14. **Average percent litter cover (%) and depth (in):** Litter depth will range from a thickness of 1 leaf to ¼ inch.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** The site has an expected annual production of about 175-225 lbs/ac during normal years.
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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:** Mound saltbush is native to the site, but has the potential to become the dominant species. Snakeweed is also a native species but also has the ability to increase and dominate a site after heavy grazing. Introduced annuals such as cheatgrass and Russian thistle have the ability to increase and co-dominate the site after heavy continuous grazing or disturbance.
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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 this 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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