

# Ecological site R035XH823AZ

## Sandstone Upland

### 17-25" p.z.

Last updated: 5/19/2025  
 Accessed: 05/25/2026

#### 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

This ecological site occurs in Common Resource Area 35.8 - the Colorado Plateau Ponderosa Pine Forests The Common Resource Area occurs within the Colorado Plateau Physiographic Province. Elevations range from 6800 to 8500 feet and precipitation averages 17 to 25 inches per year. Vegetation includes ponderosa pine, white fir, aspen, pinyon, juniper, Gambel oak, big sagebrush, ceanothus, blue elderberry, muttongrass, upland sedge, and big wildrye, mountain muhly, Arizona fescue, pine dropseed, and blue grama. The soil temperature regime ranges from mesic to frigid and the soil moisture regime is typic 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.

#### Ecological site concept

The soils grouped on this site are well drained and very shallow to sandstone bedrock. Surface textures are loamy. This ecological site occurs on structural benches and knolls of undulating plateaus. Slopes are less than 15 percent.

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Koeleria macrantha</i> (2) <i>Bouteloua gracilis</i>

#### Physiographic features

This site occurs on structural benches and knolls of undulating plateaus. The soils are shallow (<20") over sandstone bedrock. Surface textures are loamy. Slopes are less than 15 percent. This site does not benefit significantly from run-on moisture.

**Table 2. Representative physiographic features**

Landforms	(1) Structural bench (2) Knoll (3) Plateau
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Flooding frequency	None
Ponding frequency	None
Elevation	2,380 – 2,590 m
Slope	0 – 20 %
Aspect	Aspect is not a significant factor

### Climatic features

Winter-Summer moisture ratios are typically 70:30 on the west side of this common resource area 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 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 October into April. Snowpack can persist for 3-4 months, although it may disappear in exposed areas during prolonged dry weather. Summer daytime temperatures are typically 80-90 F but can exceed 95 F. Winter temperatures around 0 F are common and can reach -25 F.

Table 3 Representative climatic features

Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	640 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, where most of the vegetation production occurs. Shrubs will also harvest water from deep cracks in the bedrock. Because of the shallow soils, rapid snowmelt and larger rainfall events may not be entirely captured by the site. This site contributes runoff to other ecological sites.

### Soil features

The soils are well drained, moderately permeable soils which are very shallow to sandstone bedrock. Surface textures are loamy. Subsurface textures are sandy loam to loam. There is not an argillic layer above the sandstone bedrock.

Typical soil series for this site occurs:

SSA-715 Ft. Defiance Area AZ/NM MU 17 Berland family;

SSA-717 Shiprock Area AZ/NM MU 702 Berland.

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone
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Surface texture	(1) Loam
Family particle size	(1) Sandy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	10 – 40 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	0 – 20 %
Electrical conductivity (0-101.6cm)	0 – 10 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	5.6 – 6.5
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %

### 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

Figure 3. STM - R035XH823AZ

## Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Grasses</b>			269-717	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	90-135	–
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	0-135	–
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	45-90	–
	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	18-90	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	45-90	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-45	–
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	0-27	–
<b>Forb</b>					
2	<b>Forbs</b>			90-269	
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	45-90	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0-45	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0-45	–
	milkvetch	ASTRA	<i>Astragalus</i>	0-45	–
	geranium	GERAN	<i>Geranium</i>	0-45	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0-45	–
	silver cinquefoil	POAR8	<i>Potentilla argentea</i>	27-45	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-45	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0-45	–
	Forb, annual	2FA	<i>Forb, annual</i>	0-22	–

Table 6. Community 1.2 plant community composition

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

Site is favorable for grazing throughout most of the year except when snow cover restricts availability of forage. Planned grazing systems adapt well to use on this site. The potential plant community produced by this site provides food for those species of wildlife that utilize grass as a major portion of their diet.

## Recreational uses

Winters are cold, however, relatively mild summer months are attractive to recreationists. Activities include hunting, cross-country riding, photography, hiking, rock collecting, and wildlife observation

### Type locality

Location 1: San Juan County, NM	
Township/Range/Section	T22N R20W S13
General legal description	Approximately 7 miles southwest of Toadlena, Navajo Indian Reservation, NM

### 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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### Approval

Kendra Moseley, 5/19/2025

### 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, Arizona State Office, Phoenix, AZ
Date	08/24/2012
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** None expected, except for steeper slopes where an occasional rills may occur and cover less than 5% of the area.  

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2. **Presence of water flow patterns:** Uncommon due to moderate vegetation and rock cover. Some flow patterns may be evident follow large storm events, but should be very short and not connected.  

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3. **Number and height of erosional pedestals or terracettes:** None expected.  

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20-40 percent bare ground.  

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

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter movement will be short and most will remain in place. Most litter movement will be transported by water.  

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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):** The expected soil stability rating under plant canopies is 4 to 5 and a rating in the interspaces of 3 to 4. The surface textures loams. When well vegetated and with adequate litter cover these soils have a moderate resistance to erosion.  

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface thickness ranges from 2-4". Soil structure is typically moderate thick platy structure parting to moderate medium granular.  

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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 dominance of perennial grasses with forbs. The distribution of herbaceous and rock fragment cover helps minimizes erosion and aids in reducing surface flow to allow for infiltration.  

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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 subsurface prismatic horizon structure with 6 inches of the surface. These are not compacted layers but may difficult to excavate and mistaken for a compacted layer  

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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: Cool season grasses > warm season grasses >

Sub-dominant: Perennial forbs > Annual forbs

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**  
All plants functional groups are adapted to survival in all but the most severe droughts. Severe winter droughts affect shrubs the most. Severe summer droughts affect grasses the most.

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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 500 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: Kentucky bluegrass is a naturalized plant that can increase and dominate. Other plants that can increase with disturbance are Larkspur, lupine, rubberweed, snakeweed, goldenaster, burr buttercup, knotweed, leafy spurge and cheatgrass.**

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17. **Perennial plant reproductive capability: All plants native to this site are adapted and are capable of producing seeds, stolons and rhizomes in all but the most severe drought.**

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