

Ecological site DX035X04B204

Sandstone Upland

6-10" 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.

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.

Associated sites

R035XB201AZ	Mudstone/Sandstone Hills 6-10" p.z. Shallow sites on slopes of hills, scarps and valley sides
R035XB217AZ	Sandy Upland 6-10" p.z. Deep sandy sites on uplands
R035XB219AZ	Sandy Loam Upland 6-10" p.z. Deep sites with sandy loams on uplands

Similar sites

R035XB215AZ	Sandstone/Shale Upland 6-10" p.z. Shallow site over sandstone/shale on uplands
R035XB230AZ	Sandstone Upland 6-10" p.z. Very Shallow, Warm Calcareous sandy sites shallow to calcareous sandstone

Table 1. Dominant plant species

Tree	Not specified
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Shrub	(1) <i>Artemisia bigelovii</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i> (2) <i>Pleuraphis jamesii</i>

Legacy ID

R035XB204AZ

Physiographic features

This site occurs on summits of mesas, structural benches, and dipslopes of cuestras on undulating plateaus. Slopes range from 1-15%, with occasional slopes up to 35%. It does not benefit from run-in moisture from adjacent areas nor does it suffer from excessive runoff. It occurs on all exposures. It is associated with sandstone rock outcrops.

Table 2. Representative physiographic features

Landforms	(1) Mesa (2) Cuesta (3) Structural bench
Elevation	1,160 – 1,770 m
Slope	0 – 20 %
Aspect	Aspect is not a significant factor

Climatic features

The climate of the land resource unit is arid with warm summers and cool winters. Average annual precipitation ranges from 6 to 10 inches per year. 40 to 50 percent of the precipitation is received from October through early May. 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 an inch or two of snow accumulates and usually melts within a day or two. The remaining precipitation, approximately 50 to 60 percent, is received from July through September as spotty, violent thunderstorms. The moisture for this precipitation originates in the Gulf of Mexico and the Pacific Ocean. Late May through late June is the driest period. The mean annual temperature ranges from 53 to 56 degrees Fahrenheit (F). The frost-free period (air temperature > 32 degrees F) ranges from 135 to 160 days (@ 50 percent probability). Strong winds are common, especially in the spring.

Table 3 Representative climatic features

Frost-free period (average)	160 days
Freeze-free period (average)	180 days
Precipitation total (average)	250 mm

Influencing water features

Soil features

Soils on this site are very shallow and well drained. They are formed in eolian, residuum and alluvium derived from sandstone. Surface textures include fine sand and channery loamy fine sand. Subsoil has textures of fine sandy loam, channery fine sandy loam, and channery loamy fine sand. Hard sandstone is at depths ranging from 8 to 10 inches. Permeability based on the most restrictive horizon above 20 inches is slow to very slow. Available water capacity is very low. Runoff is medium to very high and the hazard of water erosion is moderate to severe. The hazard of soil blowing is severe. The soils are mildly to moderately alkaline (pH 7.4-8.4), non-saline to very slightly saline (EC 0-4), and non-to slightly sodic (SAR 0-13).

Characteristic taxonomic units are:

Coconino County North Kaibab part(AZ629) Soil Map Units - 30, 31 & 42 Needle;
 Navajo County Central Part(AZ633) Soil Map Units - 58;
 Little Colorado River Area (AZ707)Soil Map Units - 8 - Leupp.
 Navajo Mountain Area (AZ711)Soil Map Units - 45-Needle, 57-Tsaya family;
 Chinle Area (AZ713)Soil Map Units - 44-Needle, 47-Needle;29-Moenkopie;
 Shiprock Area (AZ-NM)(AZ717) Soil Map Units - 115-Denazin-Farb fine sands (Farb Part), 135-Farb -Rock Outcrop-Badland complex (Farb Part), 205-Shiprock-Farb Complex (Farb Part).

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone
Surface texture	(1) Fine sand (2) Channery loamy fine sand (3) Gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to moderate
Soil depth	10 – 30 cm
Surface fragment cover <=3"	20 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	0 – 6.35 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %

Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	10 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

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 data provided in this site description is standardized to the air-dry weight of one year's growth. The plant communities described in this site description are based on near normal rainfall years.

State and transition model

Figure 3. Sandstone Upland 6-10" p.z. Very Shallow State and

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Grasses			110-185	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	34-56	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	17-45	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	2-22	–
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	0-17	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	9-17	–
	Fendler's threeawn	ARPUF	<i>Aristida purpurea var. fendleriana</i>	0-11	–
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	0-11	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-11	–
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0-6	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-6	–
Forb					
2	Forbs			6-17	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-6	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	2-6	–
	Forb, annual	2FA	<i>Forb, annual</i>	0-3	–
	Eastwood's sandwort	AREA	<i>Arenaria eastwoodiae</i>	0-2	–
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	0-2	–
Shrub/Vine					
3	Shrubs			50-78	
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	6-22	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0-11	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-11	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	2-11	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	0-6	–
	Greene's rabbitbrush	CHGR6	<i>Chrysothamnus greenei</i>	0-6	–
	sand jointfir	EPAR	<i>Ephedra xarenicola</i>	0-6	–
	Torrey's jointfir	EPTO	<i>Ephedra torreyana</i>	2-6	–
	narrowleaf yucca	YUAN2	<i>Yucca angustissima</i>	0-2	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Type locality

Location 1: San Juan County, NM	
Township/Range/Section	T26N R18W S3
General legal description	Table Mesa Quad - 4.5 miles south of Table Mesa, Navajo 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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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.

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Date	08/10/2010
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** Water flow patterns occur, but are generally short in length (<2') and are broken up by bedrock, rock fragments and vegetation. The average spacing of the water flow patterns across the slope is 20 to 30 feet.

3. **Number and height of erosional pedestals or terracettes:** Some pedestalling does occur, but it is not common and pedestalls are less than 1 inch in height.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** The expected amount of bare ground is influenced by the amount of bedrock. Bare ground and bedrock combined ranges from 60 to 65 percent.

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** Larger, more persistent litter, such as twigs and branches, does not move. Smaller, less persistent litter, such as grass, forb and shrub leaves, may move short distances (< 2') in the water flow patterns.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface stability values are: Average - 3 to 4; under canopy - 4 to 6; in interspaces - 2 to 3.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface (0 to 2") is yellowish red (5YR 5/6), fine sand, weak thin platy structure in upper 1/4 inch and single grained below.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Grass/Grasslike (10 - 15% canopy, 2 - 6% basal); Shrub/Tree (6 - 12% canopy, 0 - 2% basal); Forb (0 - 2% canopy, 0 - 1% basal); Biologic Crust (0 - 2%).

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None expected.

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: Grass/Grasslikes

Sub-dominant: Shrub/Vine/Tree

Other: Forb

Additional:

- 13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
Mortality of blue grama, galleta, Indian ricegrass, Bigelow sagebrush, Mormon-tea, and other long-lived grasses, forbs and shrubs is < 10% except during prolonged, severe drought events. Expect cyclical higher mortality on shorter lived grasses, shrubs and forbs, such as sand dropseed, squirreltail, broom snakeweed and globemallow.
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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):**
The median air-dry production is 150 pounds per acre. Slightly higher production is expected at the highest elevational, highest precipitation areas of the ecological site. Slightly lower production is expected at the lowest elevational, lowest precipitation areas of the ecological site.
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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: Species native to the site that have the potential to increase are broom snakeweed, shadscale and annual forbs. Non-native species like Russian thistle and cheatgrass are the most likely to invade after severe disturbance, but minor amounts of either species (< 1%) is expected to be part of the plant community. Filaree is another invasive species that could occur.**
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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.**
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