

Ecological site R035XA106AZ

Clayey Upland

10-14" 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 35.1 - the Colorado Plateau Mixed Grass Plains Elevations range from 4800 to 6300 feet and precipitation averages 10 to 14 inches per year. Vegetation includes *Stipa* species, Indian ricegrass, galleta, and blue grama, fourwing saltbush, winterfat, and cliffrose. The soil temperature regime is mesic and the soil moisture regime is ustic 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.

Ecological site concept

Soils grouped on this site are moderately deep to deep. The surface textures are generally clay and silty clay. When dry, these soils have cracks that are one inch or more wide and 20 to 36 inches deep. This ecological site occurs in an upland position on gently sloping old valley fill plains or mesa tops. It neither benefits significantly from run-in moisture nor suffers excessively from runoff.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Atriplex canescens</i> (2) <i>Krascheninnikovia lanata</i>
Herbaceous	(1) <i>Bouteloua gracilis</i> (2) <i>Elymus elymoides</i> ssp. <i>elymoides</i>

Physiographic features

This site occurs in an upland position on gently sloping old valley fill plains or mesa tops. It neither benefits significantly from run-in moisture nor suffers excessively from runoff.

Table 2. Representative physiographic features

Landforms	(1) Mesa (2) Plain
Flooding duration	Extremely brief (0.1 to 4 hours)

Flooding frequency	None to rare
Elevation	1,460 – 1,920 m
Slope	0 – 20 %
Aspect	Aspect is not a significant factor

Climatic features

This site receives about 60% of the moisture as rain during July through September. This is the most effective and dependable moisture. The 40% received from November through February is usually in the form of light rain or snow from October through May. High velocity winds are common during the winter and spring. Long periods of time with little or no effective moisture are relatively common.

The cool season plants begin growth in early spring and mature in early summer. The warm season plants take advantage of the summer rains and growing and nutritious from July through September.

Table 3 Representative climatic features

Frost-free period (average)	160 days
Freeze-free period (average)	180 days
Precipitation total (average)	330 mm

Influencing water features

This site occurs in an upland position. The soil moisture on this ecological site comes from precipitation. It neither benefits from run-in moisture nor sustains excessive runoff.

Soil features

Soils in this site are moderately deep to deep over basalt bedrock or other plant root restricting layers. The surface soil is 4 to 8 inches thick and textures are generally clay and silty clay with granular silty clay loam or clay loam at the surface in some locations. The substratum textures are silty clay, loam, silty clay loam, or clay. Coarse fragments of gravel, cobble, or stone range from a few percent to as much as 30% by volume on the surface and in the substratum. When dry, these soils have cracks that are one inch or more wide and 20 to 36 inches deep. Runoff is slow to medium on dry soils, and medium to high on moist soils. Infiltration rate of the dry soil is very high; that of the moist soil is very low. The soils are neutral to moderately alkaline (pH 7.3 - 8.4) in reaction and soluble salt accumulations are low.

Typical taxonomic units include:

- SSA Central Coconino County(631) - Springerville MU's 043, 044, 045;
- SSA Central Navajo County(633) - Springerville MU 063;
- SSA Western Yavapai County(637) MU TcC and
- SSA Navajo Mountain Area(711) MU 65 Campanile.

Table 4. Representative soil features

Parent material	(1) Alluvium – tuff
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Surface texture	(1) Clay (2) Silty clay (3) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to very slow
Soil depth	100 – 150 cm
Surface fragment cover <=3"	0 – 30 %
Surface fragment cover >3"	0 – 30 %
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.3 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

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 and research is available, these plant communities may be revised, removed, and even added to reflect the ecological dynamics of this site.

State and transition model

Figure 3. State and Transition Model – R035XA106AZ

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Cool Season Grasses			112-213	
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	37-110	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	37-73	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	37-73	–
2	Warm Season Grasses			280-443	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	110-183	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	73-146	–
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	73-146	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	73-146	–
3	Other Grasses			39-129	
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	0-39	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-39	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-22	–
	ring muhly	MUTO2	<i>Muhlenbergia torreyi</i>	0-22	–
	spike muhly	MUWR	<i>Muhlenbergia wrightii</i>	0-22	–
	Grass, annual	2GA	<i>Grass, annual</i>	0-11	–
Forb					
4	Forbs			6-50	
	Forb, perennial	2FP	<i>Forb, perennial</i>	6-17	–
	Forb, annual	2FA	<i>Forb, annual</i>	0-11	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	0-6	–

	common sunflower	HEAN3	<i>Helianthus annuus</i>	0-6	-
	false goldeneye	HELIO4	<i>Heliomeris</i>	0-3	-
	flatspine stickseed	LAOC3	<i>Lappula occidentalis</i>	0-3	-
	ragweed	AMBRO	<i>Ambrosia</i>	0-3	-
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0-3	-
Shrub/Vine					
5	Shrubs			73-174	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	39-123	-
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	11-56	-
	Fremont's mahonia	MAFR3	<i>Mahonia fremontii</i>	0-39	-
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0-22	-
	Whipple cholla	CYWH	<i>Cylindropuntia whipplei</i>	0-11	-
	pricklypear	OPUNT	<i>Opuntia</i>	0-11	-
Tree					
6	Trees			0-17	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	0-17	-

Table 6. Community 2.1 plant community composition

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

This site is suitable for grazing during any period of the year by cows and calves, stocker cattle, sheep and horses. Prescribed grazing systems can benefit this site by allowing rest periods for the cool season species. The potential plant community provides a variety of food and cover plants for wildlife. When the vegetation complex retrogresses then unpalatable shrub species increase and the site becomes less usable as a foraging area for some species. Grazing practices that encourage cool season grass species are beneficial to antelope, cottontails and rodents. Shrubs that provide both food and cover should be maintained.

Recreational uses

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

Other information

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

Type locality

Location 1: Maricopa County, AZ	
Township/Range/Section	T25N R3W S31
General legal description	Espee Ranch, Long Point, Flagstaff, 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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Approval

Kendra Moseley, 5/20/2025

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.

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Date	03/08/2006
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None to very few. A few rills may form on the steeper slopes due to the very slow permeability of the soil and the medium runoff.

2. **Presence of water flow patterns:** Some water flow patterns and ponding areas are possible due to the very slow permeability of the soil, the medium runoff, the shrink/swell characteristics, and the physical crust on the surface, especially on the steeper slopes.

3. **Number and height of erosional pedestals or terracettes:** A few pedestals and terracettes may form on the steeper slopes due to the very slow permeability, medium runoff, and the shrink/swell characteristics of the soils.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** This site should have a moderate amount of bare ground (range 20-50%). The moderate available water capacity (7 inches average) gives the site the potential to produce a moderate percentage of plant cover. Areas with a cover of rock fragments will have less bare ground. Drought may cause an increase in bare ground.

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):** Herbaceous and fine woody litter will be transported in the water flow pathways. Coarse woody litter will remain under shrub and tree canopies.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Average site stability rating of 5 expected. Soil surface texture is clay. Most surface horizons are cobbly, but a few are stony and few do not have any fragments. The soils contain shrink/swell clays, so there are many large cracks on the surface when the soil is dry. There may be a 1/4" physical crust on the surface. When well vegetated and protected by surface rock armor, these soils have a moderate to high resistance to water erosion and a high resistance to wind erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is granular (moderate to strong, very fine to fine). Surface thickness ranges from 1 to 5 inches. Color is variable depending upon parent material.

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 relatively even distribution of grasses with some shrubs and trees. Both canopy and basal cover values (especially canopy cover) decrease during a prolonged drought. This type of plant community is moderately effective at capturing and storing precipitation.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. The surface 3 to 5 inches may be easily compacted in some areas, but the compacted layers may be broken up by the shrink/swell action of the soils. Many of the soils are protected from compaction by surface rock cover or rocks within the surface horizon.

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 bunchgrasses >>

Sub-dominant: Warm season colonizing grasses = Shrubs > Cool season bunchgrasses > Cool season colonizing grasses = Forbs

Other: Trees > Cacti

Additional:

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):** Mostly herbaceous litter with some woody litter. Litter amounts increase during the first few years of drought, then decrease in later years.
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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 450 to 650 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:** Broom snakeweed, cacti, and juniper are native to the site, but have the potential to increase and dominate the site. The decline of perennial herbaceous ground cover and increase of bare ground allows for the invasion of native and non-native annuals.
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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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