Ecological site DX035X01I117
Sandy Loam Upland
10-14" p.z.

Last updated: 5/02/2024
Accessed: 06/20/2026

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 35.1 - 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

This site occurs in an upland position on gently sloping plains or alluvial fans. Soils are moderately deep to very deep. Surface horizons have textures of sandy loam to fine sandy loam. Subsurface horizons have textures ranging from clay to sandy loam. There may be thin strata of finer and/or coarser textures. The pH ranges from neutral to moderately alkaline (pH 6.6 to 8.4).

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Krascheninnikovia lanata*
Herbaceous	(1) *Bouteloua gracilis* (2) *Bouteloua eriopoda*

Legacy ID

R035XA117AZ

Physiographic features

This ecological site occurs in an upland position on gently sloping plains or alluvial fans. It neither benefits significantly from run-in nor experiences excessive runoff of moisture.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Plain

Flooding frequency	Rare
Elevation	1,460 – 1,920 m
Slope	0 – 20 %
Aspect	Aspect is not a significant factor

Climatic features

50-60% of moisture falls as rain from July through September and is the most effective moisture for plant growth. The remaining moisture comes as snow during the winter.

Mean temperatures for the hottest month (July) is 72 degrees F; for the coldest month (January) is 32 degrees F. Extreme temperatures of 105 degrees F and -26 degrees F have been recorded. Long periods with little or no effective moisture are relatively common.

Cool season plants begin growth in early spring and mature in the early summer. Warm season plants take advantage of summer rains and grow from July through September.

Table 3 Representative climatic features

Frost-free period (average)	170 days
Freeze-free period (average)	150 days
Precipitation total (average)	280 mm

Influencing water features

This is an upland site, and is not associated with water features or wetlands. During heavy rain events, this site may receive run-on moisture from landforms above and contribute runoff to landforms below.

Soil features

These soils are moderately deep to deep with no plant root restricting layers. Surface horizons have textures of sandy loam to fine sandy loam about 4 to 10 inches thick. Subsurface horizons have textures ranging from clay to sandy loam. There may be thin strata of finer and/or coarser textures. The pH ranges from neutral to moderately alkaline (pH 6.6 to 8.4). Water erosion hazard is moderate and the wind erosion hazard is severe.

Typical taxonomic units include:
Coconino County Central (AZ631)Soil Map Units -7-Clovis loamy sand;21-Poley gravelly sandy loam;30-Poley sandy loam;27-Palma sandy loam;25-Palma;21-Keeseha gravelly sandy loam; Navajo County central (AZ633) Soil Map Units -11-Cerrillos,12-Cerrillos,44-Cerrillos;12-Ubank;
Apache County central (AZ635) Soil Map Units - CLB-Clovis, CmB-Clovis, CmC-Clovis, CnB-Clovis, CnC-Clovis, CnE-Clovis, CTB-Clovis; CTB-Palma,PAB-Palma,PSB-Palma;FRB-Fruitland;
Yavapai County western (AZ637) Soil Map Units -PaB-Palma .
Little Colorado River(AZ707) Soil Map Units- 30-Councelor
Navajo Mountain(AZ711) Soil Map Units- 5-Begay, 24-Councelor
Chinle (AZ713)Soil Map Units- 39-Councelor
Fort Defiance Area (AZ715)- Soil Map Units -
11-Begay,12-Begay;15-Betonnie,80-Betonnie;11-Milok family; 12-Penistaja;137-Zia;16-Bighams.

Table 4. Representative soil features

Parent material	(1) Alluvium – gneiss
Surface texture	(1) Sandy loam (2) Fine sandy loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Slow to rapid
Soil depth	100 – 150 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	11.68 – 23.88 cm
Calcium carbonate equivalent (0-101.6cm)	10 – 40 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %

Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Reference plant community for a site in North America is the plant community that existed at the time of European immigration and settlement. It is the plant community that was best adapted to the unique combination of environmental factors associated with the site at that time. The reference community was in dynamic equilibrium with its environment and was able to avoid displacement by the suite of disturbances and disturbance patterns (magnitude and frequency) that naturally occurred within the area occupied by the site. Natural disturbances, such as drought, fire, grazing of native fauna, and insects, were inherent in the development and maintenance of the plant community. The effects of these disturbances are part of the range of characteristics of the site that contribute to the dynamic equilibrium. Fluctuations in the plant community's structure and function caused by the effects of these natural disturbances establish the boundaries of dynamic equilibrium. They are accounted for as part of the range of characteristics for the ecological site. The reference community is not a precise assemblage of species for which the proportions are the same from place to place or from year to year. Variability is apparent in productivity and occurrence of individual species.

The reference community for this ecological site has been estimated by sampling relict or relatively undisturbed sites and/or reviewing historic records.

A plant community that is subjected to abnormal disturbances and physical site deterioration or that is protected from natural influences, such as fire and grazing, for long periods seldom typifies the reference community. Any physical site deterioration caused by the abnormal disturbance may result in the crossing of a threshold or irreversible boundary to another state, or equilibrium, for the ecological site. There may be multiple thresholds and states possible for an ecological site, determined by the type and or severity of abnormal disturbance. The known states and transition pathways for this ecological site are described in the accompanying state and transition model.

The "Plant Community Plant Species Composition" table provides a list of species and each species or group of species' annual production in pounds per acre (air-dry weight) expected in a normal rainfall year. Low and high production yields represent the modal range of variability for that species or group of species across the extent of the ecological site.

The "Annual Production by Plant Type" table provides the median air-dry production and the fluctuations to be expected during favorable, normal, and unfavorable years.

The present plant community on an ecological site can be compared to the various common vegetation states that can exist on the site. The degree of similarity is expressed through a similarity index. To determine the similarity index, compare the production 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 representative value shown in the "Annual Production by Plant Type" table for the reference plant community. Variations in production due to above or below normal rainfall, incomplete growing season or utilization must be corrected before comparing it to the site description. The "Worksheet for Determining Similarity Index" is useful in making these corrections. The accompanying growth curve can be used as a guide for estimating percent of growth completed.

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 5. State and Transition Model - R035XA117AZ

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant grasses**			359-650	
	blue grama	BOGR2	*Bouteloua gracilis*	135-269	–

	black grama	BOER4	*Bouteloua eriopoda*	135-224	–
	James' galleta	PLJA	*Pleuraphis jamesii*	22-90	–
	alkali sacaton	SPAI	*Sporobolus airoides*	22-90	–
2	**Cool season grasses**			45-174	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	22-90	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	22-90	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	6-22	–
3	**Other grasses**			45-84	
	spike dropseed	SPCO4	*Sporobolus contractus*	0-28	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0-28	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	0-28	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	0-17	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	0-17	–
	Grass, perennial	2GP	*Grass, perennial*	0-11	–
	sand milkweed	ASAR	*Asclepias arenaria*	0-9	–
	Rocky Mountain zinnia	ZIGR	*Zinnia grandiflora*	0-9	–
	Grass, annual	2GA	*Grass, annual*	0-6	–
Forb					
4	**Forbs**			22-101	
	Forb, annual	2FA	*Forb, annual*	0-22	–
	Forb, perennial	2FP	*Forb, perennial*	11-22	–
	Rocky Mountain zinnia	ZIGR	*Zinnia grandiflora*	0-11	–
	threadleaf ragwort	SEFL3	*Senecio flaccidus*	0-11	–
	western aster	SYAS3	*Symphyotrichum ascendens*	0-11	–
	globemallow	SPHAE	*Sphaeralcea*	0-6	–
	milkvetch	ASTRA	*Astragalus*	0-6	–
	rose heath	CHER2	*Chaetopappa ericoides*	0-6	–
	Esteve's pincushion	CHST	*Chaenactis stevioides*	0-6	–
	cryptantha	CRYPT	*Cryptantha*	0-6	–
	shortstem lupine	LUBR2	*Lupinus brevicaulis*	0-6	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	0-2	–
	woolly plantain	PLPA2	*Plantago patagonica*	0-2	–
	little hogweed	POOL	*Portulaca oleracea*	0-2	–
	springparsley	CYMOP2	*Cymopterus*	0-2	–
	tansymustard	DESCU	*Descurainia*	0-2	–
	touristplant	DIWI2	*Dimorphocarpa wislizeni*	0-2	–
	flatspine stickseed	LAOC3	*Lappula occidentalis*	0-2	–
	Wright's bird's beak	COWR2	*Cordylanthus wrightii*	0-2	–
	annual Townsend daisy	TOAN	*Townsendia annua*	0-2	–
	yellow salsify	TRDU	*Tragopogon dubius*	0-2	–
Shrub/Vine					
5	**Dominant shrubs**			45-146	
	fourwing saltbush	ATCA2	*Atriplex canescens*	22-90	–
	jointfir	EPHED	*Ephedra*	11-39	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	11-39	–
	Bigelow sage	ARBI3	*Artemisia bigelovii*	11-34	–

6	**Other shrubs**			17-56	
	rabbitbrush	CHRYS9	*Chrysothamnus*	0-17	–
	rubber rabbitbrush	ERNAB2	*Ericameria nauseosa ssp. nauseosa var. bigelovii*	0-17	–
	snakeweed	GUTIE	*Gutierrezia*	0-17	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0-8	–
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0-8	–
	Whipple cholla	CYWH	*Cylindropuntia whipplei*	0-8	–
	slenderleaf buckwheat	ERLE10	*Eriogonum leptophyllum*	0-8	–
	sand sagebrush	ARFI2	*Artemisia filifolia*	0-8	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0-8	–
Tree					
7	**Trees**			0-34	
	juniper	JUNIP	*Juniperus*	0-22	–
	twoneedle pinyon	PIED	*Pinus edulis*	0-22	–

Table 6. Community 1.2 plant community composition

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

Table 7. Community 2.1 plant community composition

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

Table 8. Community 3.1 plant community composition

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

Table 9. Community 4.1 plant community composition

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

Table 10. Community 5.1 plant community composition

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

Animal community

Site is favorable for grazing throughout most of the year except when snow cover restricts availability of forage. With continuous grazing use during winter and spring, the relatively scarce cool season mid grasses are replaced by rabbitbrush, snakeweed and lower value forbs and grasses. 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. When vegetative retrogression occurs, shrubby species increase and some wildlife species may benefit.

Recreational uses

This site occurs on gently sloping plains or alluvial fans with grasslands interspersed with shrubs. Winters are cold and summers are quite warm. Spring and fall are the dry seasons and are typically cool and windy. Recreational activities most likely to occur are hunting, cross-country riding, photography and wildlife observation.

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.

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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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Contact for lead author	State Rangeland Management Specialist, NRCS-Arizona State Office, Phoenix, AZ
Date	07/28/2008
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **None present on this site. Some minor rills on slopes >5% may form due to moderate permeability and moderate runoff characteristics of the soils.**

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2. **Presence of water flow patterns:** **Some water flow patterns may occur on soils that have sandy clay loam or clay loam subsurface textures, if these textures are close to the surface. These soils have moderate permeability and moderate runoff. Water flow patterns on these soils are commonly less than 4 feet long, but may be longer on steeper slopes, generally occupying < 10% of the ground cover.**

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3. **Number and height of erosional pedestals or terracettes:** **Pedestals may be common, but short in height (1/2”). Terracettes are uncommon. Both may be more developed and especially common during drought, due to high wind erosion hazard of the soils. The moderate permeability and moderate runoff conditions could lead to a few pedestals and terracettes being formed by water erosion.**

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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 averages 35 – 45% in normal years. Some sites may have biological crusts ranging 0 – 5%. Drought may lead to an increase in 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. High wind erosion hazard occurs on soils with a surface texture of sandy loam.

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7. **Amount of litter movement (describe size and distance expected to travel):** Most herbaceous and fine woody litter will be transported by wind and in water flow pathways, while a small percentage stays in place. Coarse woody litter and duff will accumulate under shrub and tree 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):** Soil aggregate stability ranges from 4 to 5 under canopy and 2 to 3 in the plant interspaces. A few soils have gravelly surfaces, but most soils do not have any rock fragments. When well vegetated, these soils have a moderate to high resistance to water erosion, but only a low resistance to wind erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is mostly granular (weak to moderate, fine to medium), but some soil surfaces are platy (weak to moderate, medium to thick). Surface thickness mostly range from 3 - 6 inches, but can range between 2 - 10 inches. Color is variable depending on 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 dominated by perennial grasses with 20 to 40% cover, then by evergreen shrubs 15 to 20% cover, 1 to 5% cover in forbs, and 1 to 2% cover in trees in some locations. Both canopy and basal cover values of grasses and some shrubs decrease during prolonged drought. Due to soil textures, slope and vegetative composition, this site is moderately effective at capturing and storing 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. These soils are not easily compacted. Many of the soils have a weak granular structure.

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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 colonizing grasses(20-30%)> shrubs

    Sub-dominant: shrubs (15-20%)> cool season bunchgrasses (5-15%)> warm season bunch grasses (5-10%)

    Other: forbs (1-5%)> trees (< 2%)

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** **In a normal year up to 10% of grasses and shrubs die off. During and after drought years there can be from 10 to 20% die off of shrubs and grasses. Severe winter droughts affect shrubs, trees and cool season grasses the most. Severe summer droughts affect the warm season grasses the most.**

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14. **Average percent litter cover (%) and depth (in):** **Average percent litter cover 25-40% and depth 1/8 inches. Within plant interspaces litter ranges from 10 to 20 % cover with depths up to 1/8 inch, while under shrub and tree canopies it ranges from 50 to 75% cover with depths from 1/8 to 1/2 inches thick.**

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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 700 to 800 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 (GUSA2), Rabbitbrush (Chrysothamnus spp.), false buffalograss (MOSQ)and sixweeks fescue (VUOC) are native to the site, but they have the potential to increase and dominate the site after unmanaged grazing. Utah and oneseed juniper (JUOS & JUMO) and Colorado Pinyon (PIED) are native to the site, but have the potential to increase and dominate the site after disturbance and/or fire exclusion. Cheatgrass (BRTE) is an exotic grass that has the potential to invade and dominate the site, with or without disturbance. Lambsquarters (CHAL7) and Russian thistle (SATR12) are annual exotic forbs that have the potential to invade and dominate the site after disturbance, especially if the site is near farm fields or disturbed lands.**

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17. **Perennial plant reproductive capability:** **All plants native to this site are adapted to the climate and are capable of producing seeds, stolons and rhizomes except during the most severe droughts.**
