

Ecological site R035XA119AZ

Shallow Loamy

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

“PROVISIONAL ecological site concepts developed and described. See Project Plan [insert Project Plan Name] for more details and related milestones.” This ecological site occurs in Land Resource Unit 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

“ATTENTION: This ecological site meets the requirements for PROVISIONAL (if not more). A provisional ecological site is established after ecological site concepts are developed and an initial state-and-transition model is drafted. A provisional ecological site typically will include literature reviews, land use history information, legacy data (prior approved range site descriptions, forage suitability groups, woodland suitability groups, etc.), and includes some soils data, and estimates for canopy and/or species composition by weight,. A provisional ecological site provides the conceptual framework of soil-site correlation for the development of the ESD. For more information about this ecological site, please contact your local NRCS office.”

Table 1. Dominant plant species

Tree	(1) <i>Juniperus</i>
Shrub	(1) <i>Atriplex canescens</i> (2) <i>Artemisia bigelovii</i>
Herbaceous	(1) <i>Hesperostipa comata</i> ssp. <i>comata</i> (2) <i>Hesperostipa neomexicana</i>

Physiographic features

This site occurs in an upland position on structural benches, mesas and ridges. Slopes generally range from 0-15% with occasional steeper slopes. It does not benefit significantly from run-in moisture or suffer from excessive run-off.

Table 2. Representative physiographic features

Landforms	(1) Mesa (2) Ridge (3) Structural bench
Flooding frequency	None to 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 Jul-Sept and is the most effective moisture for plant growth. The remaining moisture comes as snow during the winter.

Mean temperatures for the hottest month (Jul) is 72 degrees F; for the coldest month (Jan) 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 the summer rains and grow and retain their nutrition from July through September.

Table 3 Representative climatic features

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

Influencing water features

It does not benefit significantly from run-in moisture or suffer from excessive run-off.

Soil features

Soils in this site are very shallow and shallow (5-20 inches) to limestone, sandstone or basalt bedrock or other plant root restricting layers. The surface soil ranges in texture from a gravelly light clay loam to stony sandy loam about 2-12 inches thick over a weakly to strongly lime cemented layer or bedrock. Soil pH ranges from 7.0 to 8.4. The soils contain coarse fragments from 10 to more than 50 percent by volume. Lime content of the soil varies from 5 to more than 40 percent. Available water capacity is low, and there is medium to rapid runoff.

Typical taxonomic units include:

Coconino County Central part (AZ631) MU's Apache-8; Boysag-62; Cross-3, 8; Daze-9; Deama-9; Winona-60, 61, 62, 64 & 66:

Navajo County Central part (AZ633) MU's Bisoodi fsl-7, 33, 34; Mellenthin-39 & 57:

Yavapai County Western part (AZ637) MU's Apache-As, At, CzC; Boysag-PuC, Cabezon-CzC; Cross-CzC; Dye-DgC, DrC, Pvd; Purner-PrC, PsC, PsD, PuC, Pvd & PwD; Tortugas-TIB, TmD & TnF:

Little Colorado River Area (AZ707) MU's Cross 2, Mellenthin 25 & 27, Winona 66;

Figure 5. Soil Pit

Table 4. Representative soil features

Parent material	(1) Pyroclastic flow – limestone and sandstone (2) Colluvium – limestone (3) Residuum – sandstone
Surface texture	(1) Gravelly loam (2) Stony sandy loam (3) Very stony fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderate
Soil depth	10 – 50 cm
Surface fragment cover <=3"	10 – 20 %
Surface fragment cover >3"	10 – 30 %
Available water capacity (0-101.6cm)	6.35 – 12.7 cm
Calcium carbonate equivalent (0-101.6cm)	20 – 50 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10

Soil reaction (1:1 water) (0-101.6cm)	10 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	10 – 20 %
Subsurface fragment volume >3" (Depth not specified)	10 – 20 %

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 6. 35.1AZ Shallow Loamy 10-14"p.z. Reference State

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			280-443	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	62-112	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	62-112	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	56-84	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	56-84	–
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	28-56	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	28-56	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	28-56	–

2	Other Cool Season Grasses			39-123	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0-34	-
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0-34	-
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-22	-
	muttongrass	POFE	<i>Poa fendleriana</i>	0-22	-
	Grass, annual	2GA	<i>Grass, annual</i>	0-6	-
3	Other Warm Season Grasses			39-90	
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	0-17	-
	ring muhly	MUTO2	<i>Muhlenbergia torreyi</i>	0-17	-
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0-17	-
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-17	-
	Grass, annual	2GA	<i>Grass, annual</i>	0-11	-
	threeawn	ARIST	<i>Aristida</i>	0-11	-
Forb					
4	All forbs			37-73	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-34	-
	Forb, annual	2FA	<i>Forb, annual</i>	0-17	-
	spike muhly	MUWR	<i>Muhlenbergia wrightii</i>	6-11	-
	threeawn	ARIST	<i>Aristida</i>	0-11	-
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0-11	-
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	0-11	-
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0-11	-
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-11	-
	slim tridens	TRMU	<i>Tridens muticus</i>	0-11	-
	vine mesquite	PAOB	<i>Panicum obtusum</i>	0-11	-
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0-6	-
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	0-6	-
	hairy woollygrass	ERPI5	<i>Erioneuron pilosum</i>	0-6	-
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	0-6	-
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	0-6	-
	ring muhly	MUTO2	<i>Muhlenbergia torreyi</i>	0-6	-
	Hall's panicgrass	PAHA	<i>Panicum hallii</i>	0-6	-
	Grass, annual	2GA	<i>Grass, annual</i>	0-6	-
	sego lily	CANU3	<i>Calochortus nuttallii</i>	0-6	-
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0-6	-
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	0-6	-
	buckwheat	ERIOG	<i>Eriogonum</i>	0-6	-
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0-6	-
	cleftleaf wildheliotrope	PHCR	<i>Phacelia crenulata</i>	0-6	-
	little hogweed	POOL	<i>Portulaca oleracea</i>	0-6	-
	globemallow	SPHAE	<i>Sphaeralcea</i>	0-6	-
Shrub/Vine					
5	Dominant shrubs			73-110	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	17-62	-
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	8-39	-
	jointfir	EPHED	<i>Ephedra</i>	6-28	-

	bastardsage	ERWR	<i>Eriogonum wrightii</i>	6-28	-
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	6-28	-
6	Other shrubs			37-73	
	rabbitbrush	CHRY9	<i>Chrysothamnus</i>	0-22	-
	Apache plume	FAPA	<i>Fallugia paradoxa</i>	0-22	-
	snakeweed	GUTIE	<i>Gutierrezia</i>	0-22	-
	Mexican cliffrose	PUME	<i>Purshia mexicana</i>	0-22	-
	spineless horsebrush	TECA2	<i>Tetradymia canescens</i>	0-22	-
	woolly groundsel	PACA15	<i>Packera cana</i>	0-11	-
	Fremont's mahonia	MAFR3	<i>Mahonia fremontii</i>	0-11	-
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0-11	-
	desert sweet	CHMI2	<i>Chamaebatiaria millefolium</i>	0-11	-
	pricklypear	OPUNT	<i>Opuntia</i>	0-6	-
	Whipple cholla	CYWH	<i>Cylindropuntia whipplei</i>	0-6	-
Tree					
7	Trees			15-39	
	oneseed juniper	JUMO	<i>Juniperus monosperma</i>	0-22	-
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	0-22	-
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	0-11	-

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 1.3 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 adapt well to this site. The potential plant community provides a variety of food and cover plants for wildlife. Areas where rock outcrops occur are important cover areas for various species such as cottontail, wrens and reptiles.

Hydrological functions

This site is particularly susceptible to water erosion.

Recreational uses

Since this site is located on open plains and occasional broken topography showing exposed bedrock it has a variety of spring and summer flowering shrubs and forbs. Open grassland with occasional brushy thickets give the site good aesthetic appeal. Winters are cold, however, relatively mild spring, fall and summer months are attractive to recreationists. Hunting, rockhounding, wildlife observation, and horseback riding are activities suited to the site.

Wood products

Personal fuelwood cutting is possible on the lesser sloping areas.

Type locality

Location 1: Apache County, AZ

Township/Range/Section	T27E R2E S12
General legal description	John Osborne Ranch

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)	Karlyn Huling
Contact for lead author	NRCS State Rangeland Management Specialist, Phoenix, AZ
Date	03/23/2006
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** A few rills may occur on steeper slopes due to moderate permeability, rapid runoff and shallow depth of soils. They should be very uncommon in areas that have a lot of rock fragments on the surface and in the soil profile.
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2. **Presence of water flow patterns:** Water flow patterns may be common due to moderate permeability, rapid runoff, and shallow depth of soils. Flow pattern will increase after drought dieback. There will be more water flow patterns on very shallow (<10") soils and in areas adjacent to large expanses of rock outcrop.
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3. **Number and height of erosional pedestals or terracettes:** A few pedestals and terracettes may form, but they should be very short.
-
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 20-40%. Sites with a greater cover of rock fragments or bedrock have less bare ground. This site has an average water capacity of only 2 inches, so the potential to produce plant cover is very low, except in areas where plants have access to water in bedrock crops. 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 water flow pathways. Coarse woody litter will remain under shrub and tree canopies. Litter movement may be greater on very shallow soils or in areas adjacent to large expanses of rock outcrop.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil aggregate stability ratings average 5 under plant canopy and 3 in the interspaces. Many areas are protected by blue grama root mats and rock fragments. Soil surface textures range from sandy loam to clay loam. Many soils have a significant amount of rock fragment armor on the surface and in the profile. When well vegetated or covered with rock armor, soils have a high resistance to both water and 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 predominantly granular (weak fine, moderately fine and strong fine), but some soils have subangular blocky (weak to moderate, fine to medium) or massive surface structures. Some soils have a platy (weak, medium) surface structure. Surface thickness ranges from 1-12 inches. Surface colors vary 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 characterized by a relatively uniform distribution of mostly grasses with some shrubs and a few forbs. Some locations have an open scattered tree canopy. Canopy cover averages 35% (20% grasses, 3% forbs, 10% shrubs, 2% trees). Basal cover of plants averages 10% (8% grasses, 1% forbs, 1% shrubs, trace moss/lichen). The cover (especially basal cover) is reduced by the amount of rock fragment ground cover. Both cover values (especially canopy cover) decrease during a prolonged drought. This type of plant community 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 due to large amount of rock fragments on the surface and in the profile. In areas without significant rock fragments, however, most soil types may be easily compacted when wet. One soil sometimes has a natural platy surface structure.

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 bunchgrasses

Sub-dominant: warm season bunchgrasses > warm season colonizing grasses > shrubs

Other: Minor: forbs > trees > cacti Trace: cool season colonizing grasses = annual grasses

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
All functional groups are adapted for survival except during the most severe droughts. Severe winter droughts affect shrubs and trees the most. Severe summer droughts affect grasses the most. Very shallow (<10") soils will show the most mortality in all functional groups.

14. **Average percent litter cover (%) and depth (in):** Mostly herbaceous litter, but up to 1/3 may be woody. There is generally less litter on rocky sites. Litter amounts increase during the first few years of drought, then decrease in later years.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
250-500 pounds per acre (dry weight) in drought years, 400-650 pounds per acre in median years, 550-800 pounds per acre in wet years.

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:** Greene rabbitbrush, Douglas rabbitbrush, broom snakeweed, baby aster and Whipple cholla re native to the site, but have the potential to increase and dominate the area after disturbance. Oneseed juniper is native to the site, but has the potential to increase and dominate after unmanaged grazing and/or fire exclusion. Russian thistle is an exotic forb that can invade the site from neighboring farm fields and disturbed lands if the soil is disturbed.

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 in all but the most severe droughts.
