

Ecological site R035XC306AZ

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 35.3 – the Colorado Plateau Sagebrush – Grasslands Elevations range from 4800 to 6700 feet, and precipitation averages 10 to 14 inches. Vegetation includes Wyoming big sagebrush, Utah juniper, Colorado pinyon - cliffrose, Mormon tea, fourwing saltbush, blackbrush, Indian ricegrass, needle and thread, western wheatgrass, Galleta, black grama, blue grama, and sand dropseed. 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 ecological site occurs in an upland position on mesas, fans, and plateaus. Slopes range from 0 to 15 percent. The soil of this site is moderately deep to very deep to any plant root restricting layer. The surface texture of the soil includes clay, cobbly clay, and silty clay. Subsurface horizon textures are predominantly clay to clay loam but occasionally are loam. The surface soils on this site are shrink swell clays that create large cracks in the surface when the soil is dry.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i>
Herbaceous	(1) <i>Bouteloua gracilis</i>

Physiographic features

This ecological site occurs in an upland position on mesas, fans, and plateaus. Slopes range from 0 to 15 percent. The soil of this site is deep to very deep to any plant root restricting layer. Soil cracking is noticeable on the soil surface when the soil is dry due to the shrink-swell nature of the soil.

Table 2. Representative physiographic features

Landforms	(1) Mesa (2) Plateau (3) Fan
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Flooding frequency	None
Ponding frequency	None
Elevation	1,460 – 1,770 m
Slope	0 – 20 %
Aspect	Aspect is not a significant factor

Climatic features

Winter summer moisture ratios range from 70:30 to 60:40. 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 December through February. Accumulations above 12 inches are not common but can occur. Snow usually lasts for 3-4 days but can persist much longer. Summer daytime temperatures are commonly 95 - 100 F and on occasion exceed 105 F. Winter air temperatures can regularly go below 10 F and have been recorded below - 20 F.

Table 3 Representative climatic features

Frost-free period (average)	170 days
Freeze-free period (average)	190 days
Precipitation total (average)	360 mm

Influencing water features

The soil moisture on this ecological site comes from precipitation. The site does not benefit significantly from run-on moisture.

The cracking clay soil allows the site to capture most of the the precipitation events when the site is dry, and water can be captured by the cracks in the surface of the soil. If the soil is wet, and the cracks have swelled shut, then the the infiltration is very slow, and most of the rainfall will run off.

Soil features

The surface soils on this site are shrink swell clays that create large cracks in the surface when the soil is dry. The soil of this site is moderately deep to very deep to any plant root restricting layer. The surface texture of the soil includes clay, cobbly clay, and silty clay. Subsurface horizon textures are predominantly clay to clay loam but occasionally are loam. The soil reaction ranges from slightly to moderately alkaline (7.4 to 9.0) and is non to slightly effervescent throughout the soil profile. Permeability is slow to very slow.

Soil survey map unit components correlated to this ecological site include:

SSA 625 Mohave County Area NE part 9-Campanile, 43-Campanile/Padilla;

SSA 715 Fort Defiance Area 18-Chafin, 128-Venadito.

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone and shale
Surface texture	(1) Clay (2) Cobbly
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderately slow to slow
Soil depth	100 – 200 cm
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	21.34 – 24.38 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 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. 352 ClayeyUpland S&T

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Warm Season Perennial Grasses			224-560	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	112-252	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	84-168	–
	black grama	BOER4	<i>Bouteloua eriopoda</i>	56-168	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	28-84	–
2	Cool Season Perennial Grasses			168-504	
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	84-168	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	56-140	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	56-140	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	56-140	–
3	Other Grasses			45-112	
	threeawn	ARIST	<i>Aristida</i>	11-39	–
	ring muhly	MUTO2	<i>Muhlenbergia torreyi</i>	11-39	–
	spike muhly	MUWR	<i>Muhlenbergia wrightii</i>	11-39	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	11-39	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-17	–
	Grass, annual	2GA	<i>Grass, annual</i>	0-11	–
Forb					
4	Forbs			11-39	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	84-168	–
	Forb, annual	2FA	<i>Forb, annual</i>	0-22	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-22	–

	globemallow	SPHAE	<i>Sphaeralcea</i>	0-22	-
Shrub/Vine					
5	Shrubs			112-280	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	84-168	-
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	45-140	-
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	45-140	-
	jointfir	EPHED	<i>Ephedra</i>	45-140	-
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	6-11	-
Tree					
6	Trees			0-84	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	126-252	-
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	0-84	-
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	0-84	-

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 3.1 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 throughout most of the year with shrubs providing forage during the period when snow covers palatable grasses. Habitat diversity on this site is fair when moderate amounts of shrubs and trees are present. Permanent waters are lacking as are diverse tree species and growth forms. Typical animals on the site include rabbits, mule deer, antelope, various song birds, and raptors.

Recreational uses

The land form of this site is old basalt flows or eroded clay bottoms or swales. This site is a grassland interspersed with shrubs and a few trees. Winters are cold and spring tends to be windy. Late spring, summer, and fall provide attractive recreation weather. Sport hunting is the main activity of this site. Other recreation activities, such as cross country riding, photography, and wildlife observation are incidental.

Wood products

No wood products are produced from this site.

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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Approval

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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)	Steve Cassady, Kyle Spencer, Tobiah Salvail
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Date	04/29/2008
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** None

3. **Number and height of erosional pedestals or terracettes:** No pedestals, but turf building is common under long-lived perennial grasses and shrubs.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**
Bare ground is <50%.

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):** Litter does not move appreciably except during the largest storm events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface of this site normally seals, developing a very strong cap very resistant to erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface of soils associated with this site are moderate thin platy structure parting to strong very fine angular blocky; extremely hard, very firm, very sticky, and very plastic. Color is reddish brown (2.5YR 4/4) dry and dark reddish brown (2.5YR 3/4) moist.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Randomly scattered plants consisting of about 75 percent grasses, 20 percent shrubs and 5 percent forbs promote infiltration and reduce runoff. The average distance to the nearest perennial plant (fetch) ranges from 4 to 8 inches with the majority ranging from 1 to 10 inches but occasionally as far as 20 inches.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer, although a harder clay layer is encountered about 15 inches below the soil surface.

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: Grasses (65-80%) >> shrubs (15-30%) > forbs (1-5%)

Sub-dominant:

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** In "normal" precipitation years mortality should be no more than 10 percent. During periods of prolonged drought mortality may be much higher, especially on half-shrubs and 80 to 90 percent death on Wyoming big sagebrush has been observed.

14. **Average percent litter cover (%) and depth (in):**

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 700-800 lbs/ac in a year of average precipitation.

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: Russian thistle (*Salsola kali*), cheatgrass (*Bromus tectorum*), and lambsquarter (*Chenopodium album*) are commonly found in small amounts on the site (< 2 percent). During years of above average winter and spring moisture the composition of these may increase slightly. Severe disturbance may cause an increase in one or all of these plants creating a potential for a shortened fire frequency on the site which could result in crossing a threshold to a state with increased introduced annual plants and fewer native shrubs.

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