

Ecological site R035XC310AZ Limy Slopes 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.

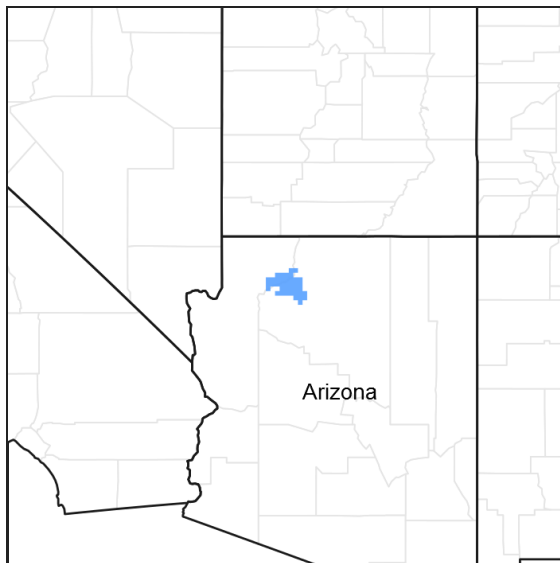


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 035X–Colorado Plateau

AZ CRA 35.3 – Colorado Plateau Sagebrush – Grasslands

Elevations range from 4500 to 6000 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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata ssp. wyomingensis</i> (2) <i>Artemisia bigelovii</i>
Herbaceous	(1) <i>Bouteloua eriopoda</i> (2) <i>Hesperostipa comata</i>

Physiographic features

This site occurs as undulating plains and rolling hills in an upland position. It does not significantly benefit from run-in moisture. The kind and amount of vegetation is greatly influenced by the high amount of calcium carbonate in the soil.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,707–1,829 m
Slope	15–35%
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)	168 days
Freeze-free period (average)	193 days
Precipitation total (average)	356 mm

Influencing water features

Soil features

Soils grouped into this range site are shallow to plant root restriction layers. Surface textures are loam, gravelly loam, very gravelly loam and gravelly fine sandy loam. Subsurface textures are loam or sandy loam with rock fragments ranging from 35-80%. Soil reaction is slightly to moderately alkaline (pH 7.4-8.4). Water erosion hazard is slight to severe.

Typical taxonomic units on this site include:

SSA 699 Hualapai-Havasupai Area MU 55 Tusayan;

SSA 701 Grand Canyon Area MU's 51 Ustic Haplocalcids & Ustic Petrocalcids, 66 Tusayan.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone
Surface texture	(1) Gravelly loam (2) Very gravelly fine sandy loam (3) Extremely gravelly

Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	51–102 cm
Surface fragment cover <=3"	5–20%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	4.01–7.11 cm
Calcium carbonate equivalent (0-101.6cm)	10–40%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	25–85%
Subsurface fragment volume >3" (Depth not specified)	0–20%

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 fire, grazing, 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 amount shown for each group. Divide the resulting total by the total normal year production shown in the plant community description. If the 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.

State and transition model



**State 1
Historic Climax Plant Community**

**Community 1.1
Historic Climax Plant Community**

This range site is primarily made up of mid and short grasses with a relatively large shrub component. The high lime content in the soils make the site somewhat harsh for plant growth. Species most likely to increase when the site is disturbed are big sagebrush, snakeweed and cactus. Invaders include cheatgrass and russian thistle.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	278	316	353
Shrub/Vine	151	177	202
Forb	6	16	26
Total	435	509	581

Figure 5. Plant community growth curve (percent production by month). AZ3531, 35.3 10-14" p.z. all sites. Growth begins in the spring and continues through the summer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	3	17	18	10	19	20	10	1	1	0

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				101–151	
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	101–151	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	101–151	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	101–151	–
2				25–50	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	25–50	–
3				25–50	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	25–50	–
4				50–76	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	50–76	–
5				16–25	
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	16–25	–
6				4–25	
	wildrye	ELYMU	<i>Elymus</i>	4–25	–
7				25–50	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	25–50	–
8				4–25	
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	4–25	–
	threeawn	ARIST	<i>Aristida</i>	0–1	–
9				4–16	
	threeawn	ARIST	<i>Aristida</i>	4–16	–
Forb					
10				4–16	
	globemallow	SPHAE	<i>Sphaeralcea</i>	4–16	–
11				16–25	
	Forb, annual	2FA	<i>Forb, annual</i>	16–25	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	16–25	–
Shrub/Vine					
12				50–101	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	50–101	–
	jointfir	EPHED	<i>Ephedra</i>	50–101	–
13				4–25	
	Apache plume	FAPA	<i>Fallugia paradoxa</i>	4–25	–
	Mexican cliffrose	PUME	<i>Purshia mexicana</i>	4–25	–
14				25–50	
	buckwheat	ERIOG	<i>Eriogonum</i>	25–50	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	25–50	–
15				16–25	

	barberry	BERBE	<i>Berberis</i>	16–25	–
	snakeweed	GUTIE	<i>Gutierrezia</i>	16–25	–
16				25–50	
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	25–50	–
17				25–50	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	25–50	–
18				4–16	
	pricklypear	OPUNT	<i>Opuntia</i>	4–16	–
	yucca	YUCCA	<i>Yucca</i>	4–16	–

Animal community

This is one of the least productive sites in the MLRA. Once the site is deteriorated, it is very slow to respond to improved management. Brush management is not practical on the site compared to sites with higher cost return benefits. The site is suitable for use by all classes of livestock. Snow cover may bury the better forage plants for short periods of time in winter.

Recreational uses

The site occurs as undulating plains and rolling hills. It offers diversity in plant life and tends to contrast with adjacent grassland sites. Winters are cold and damp. Summers are warm to very warm. Spring and fall are cool and normally windy. The site is suited for horseback riding, wildlife observation and hiking.

Other information

T&E species: Golden eagle and Prairie falcon

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)	Karlynn Huling
Contact for lead author	NRCS Flagstaff Area Office
Date	03/24/2007
Approved by	S. Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** A few rills may form due to loamy surface textures, moderate permeability, very rapid runoff and steep slopes, but they are not likely in most areas due to extensive surface cover of rock fragment armor and large amounts of rock fragments in the profile.

2. **Presence of water flow patterns:** Water flow patterns may be common due to moderate permeability, relatively shallow depth, very rapid runoff, and steep slopes, but they are not likely in most areas due to extensive surface cover of rock fragment armor.

3. **Number and height of erosional pedestals or terracettes:** Some short pedestals and terracettes may form, but they will be limited by the amount of surface rock fragments.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Areas with a greater cover of rock fragments will have less bare ground. Drought may cause an increase in bare ground. This site has only 2 inches of available water capacity, so potential for production of plant cover is very low.

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, fine woody litter, and some coarse woody litter, will be transported in water flow pathways.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface textures are loam and fine sandy loam. All surface horizons contain a significant amount of rock fragments (gravels and/or cobbles). Many soils have a large cover of rock fragment armor (gravels and/or cobbles) on the surface. When well vegetated or covered with rock armor, soils have a high resistance to both water and wind erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is granular (moderate, fine) or subangular blocky (moderate, fine). Surface thickness ranges from 2-4 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 mostly grasses and shrubs across the landscape. Canopy and basal cover are dominated by grasses. Both plant cover values (especially basal) decrease during a prolonged drought. This type of plant community is slightly to 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. These soils are not easily compacted due to extensive cover of rock fragment armor (in many areas) and the high volume of rock fragments in the surface horizons of the profile. Inclusion soils with very few rock fragments will be easily compacted.
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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: none
- Sub-dominant: shrubs > cool season bunchgrasses > warm season bunchgrasses > warm season colonizing grasses >
- Other: Minor (3-10%): forbs >
- Trace (<3%): cacti = Agave family
- Additional:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All plant functional groups are adapted to survival except during 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):** 350-400 pounds per acre (dry weight) in dry years, 400-575 pounds per acre in median years, 575-700 pounds per acre in wet years.
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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, Wyoming big sagebrush, pricklypear Cactus (*Opuntia*), and cholla cactus (*Cylindropuntia*) are native to the site, but have the potential to increase and dominate the site after heavy grazing. Cheatgrass is an exotic annual grass that may invade and dominate the site after heavy grazing and/or fire. Russian thistle is an exotic annual forb that may invade from adjacent disturbed areas after heavy grazing and soil disturbance.
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17. **Perennial plant reproductive capability:** All plants native to the site are adapted to the climate and are capable of producing seeds, stolons and rhizomes except during the most severe droughts.
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