

## Ecological site R035XC305AZ Clayey Bottom 10-14" p.z.

Accessed: 05/03/2024

### 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.

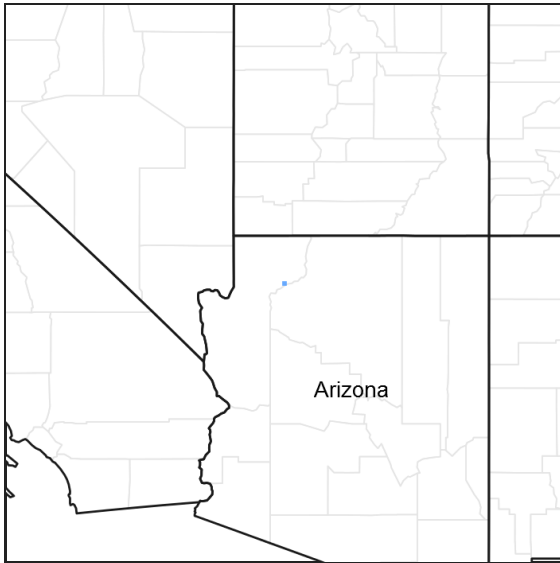


Figure 1. Mapped extent

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

This ecological site occurs in Common Resource Area 35.2 - the Colorado Plateau Shrub – Grasslands

Elevations range from 3800-5800 feet and precipitation averages 10 to 14 inches per year. Vegetation includes shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. The soil temperature regime is mesic and the soil moisture regime is typic 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>Atriplex canescens</i>
Herbaceous	(1) <i>Pascopyrum smithii</i> (2) <i>Bouteloua gracilis</i>

### Physiographic features

This range site occurs in a bottom position. It benefits from run-in moisture from adjacent areas. The soil of the site is deep. Soil surface textures range from sandy clay loam to clay. The subsurface horizons range from clay to clay loam. The soil is calcareous throughout, ranging from slightly to strongly effervescent. Slope range from 0 to 15 percent.

**Table 2. Representative physiographic features**

Landforms	(1) Swale (2) Wash (3) Stream terrace
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	1,158–1,768 m
Slope	0–5%
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**

The soil moisture on this ecological site comes from precipitation and run-on moisture following storm events. The stream terrace portions of the site benefit from lateral underground water movement from the streambed. This additional moisture allows this site to produce significantly more vegetation than upland sites that depend entirely on rainfall.

### **Soil features**

Soils on this site are moderately deep to deep (over 40"). Surface soils range from sandy clay loam to clay normally 4-10 inches thick. Subsurface textures ranges from clay to clay loam. Strata containing finer or coarser material and/or shale may occur through the profile. These soils range from slightly to strongly calcareous. Reaction of the soil is moderately alkaline with a pH of 7.8-8.4. Soils are very well drained.

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

SSA 701 Grand Canyon Area 155-Ustic Torriorthents;

**Table 4. Representative soil features**

Parent material	(1) Alluvium–basalt
Surface texture	(1) Silty clay loam (2) Sandy clay loam (3) Clay
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	21.72–24.77 cm
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

## Ecological dynamics

The historic climax plant community (HCPC) 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. The historic climax plant community was in dynamic equilibrium with its environment. It is the plant community that 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 these plant communities. The effects of these disturbances are part of the range of characteristics of the site that contribute to that dynamic equilibrium. Fluctuations in plant community 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 an ecological site. Some sites may have a small range of variation, while others have a large range.

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

Plant communities that are subjected to abnormal disturbances and physical site deterioration or that are protected from natural influences, such as fire and grazing, for long periods seldom typify the historic climax plant community. The physical site deterioration caused by the abnormal disturbance results 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 specie's 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**

**1 Reference State**

1.1 Native Grassland Community with Scattered Shrubs (HCPC)

Common Plants: PASM, PLJA, ELEL5, ACHY, ATCA2, KRLA2

1.1A

1.2 Native Grassland/Shrubland Community

Common Plants: PASM, PLJA, ELEL5, ACHY, ATCA2, KRLA2

**2 Native/Non-Native Community**

2.1 Native Shrubland Overstory

Common Plants: SPAI, PLJA, ELEL5, ATCA2, SAVE4, CYWH, KRLA2, *Chenopodium*, Annual *Helianthus*

2.1A

2.2A

2.2 Native Shrubland Overstory with Non-native Species

Common Plants: SPAI, PLJA, ELEL5, ATCA2, SAVE4, CYWH, KRLA2, SATR12, *Chenopodium*, Annual *Helianthus*

T2A

R3A

**3 Eroded State**

3.1 Russian Thistle Invasion with Scattered Native Shrubs

Common Plants: SATR12, KRLA2, CHGR6, ATCA2

**Legend for Plant Community**

**Grasses:**

- ACHY= Indian ricegrass
- ELEL5= bottlebrush squirreltail
- PLJA= James' galleta
- PASM= western wheatgrass
- SPAI= alkali sacaton

**Forbs:**

- SATR12= Russian thistle
- Chenopodium*= goosefoot genus
- Helianthus*= sunflower genus

**Shrubs:**

- KRLA2= winterfat
- SAVE4= black greasewood
- CYWH= whipple cholla
- CHGR6= Greene's rabbitbrush
- ATCA2= fourwing saltbush

**Legend for Transitions**

1.1A=Continuous Yearlong Herbivory/ Introduction of Non-native Species

T1A= Continuous Yearlong Herbivory/ Drought

R2A= Prescribed Grazing/ Rest/ Shrub Treatment

2.1A= Continuous Yearlong Herbivory/ Drought/ Increase of Non-native Species

2.2A= Prescribed Grazing/ Rest

T2A = Continuous Yearlong Herbivory/ Drought/ Unmanaged Range/ Invasion of Non-native Species

R3A= Prescribed Grazing/Rest/ Shrub Treatment/ Weed Management/ Reseeding

Figure 4. R035XC305AZ

**State 1  
Historic Climax Plant Community**

**Community 1.1  
Historic Climax Plant Community**

This site supports a grassland interspersed with small amounts of shrubs. In the original plant community, there is a mixture of both cool and warm season grasses. Plants most likely to invade or increase on this site are big sagebrush, rabbitbrush, broom snakeweed, mat muhly, and annuals. Continuous winter and spring grazing use will eliminate the cool season mid-grasses.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	925	–	1110
Shrub/Vine	123	–	247
Forb	62	–	123
<b>Total</b>	<b>1110</b>	–	<b>1480</b>

## **Community 1.2 Native Grassland/Shrubland Community**

This site has an increase in the less desirable shrubs compared to Community Phase 1. Trace amounts of non-native species may be found, however, they do not change the function of the site. Prescribed grazing can help to shift this site back to a dominated grassland community, however, traces of non-native species will always remain.

## **State 2 Native/Non-native State**

### **Community 2.1 Native Shrubland Overstory**

This site is dominated by shrubs with scattered grasses. Bareground has increased from the previous state, increasing the chances for erosion. Non-native species may be found in trace amounts but do not affect the function of this site. Resting this site could help restore it to the reference community.

### **Community 2.2 Native Shrubland Overstory with Non-native Species**

This site is dominated by a shrubland overstory with scattered grasses found much like in community phase 2.1. It differs in that it has an increase in non-native species that change the function of this site. Resting this site gives it the potential to be more productive with desirable species.

## **State 3 Eroded State**

### **Community 3.1 Russian Thistle Invasion with Scattered Shrubs**

This site is extremely disturbed. Bareground is dominant, so chances of erosion are high. Russian thistle has replaced most vegetation with only a few small shrubs scattered around. Reclaiming this site will take a lot of resources and a planned grazing system.

## **Additional community tables**

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				432–616	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	432–616	–
2				62–123	
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	62–123	–
3				62–123	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	62–123	–
4				247–432	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	247–356	–
5				62–185	
	spike muhly	MUWR	<i>Muhlenbergia wrightii</i>	62–185	–
6				12–62	
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	12–62	–
7				0–62	
	threeawn	ARIST	<i>Aristida</i>	0–62	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	0–62	–
	tumblegrass	SCPA	<i>Schedonnardus paniculatus</i>	0–62	–
<b>Forb</b>					
8				0–2	
	desertparsley	LOMAT	<i>Lomatium</i>	0–2	–
9				0–37	
	globemallow	SPHAE	<i>Sphaeralcea</i>	0–37	–
10				0–62	
	menodora	MENOD	<i>Menodora</i>	0–62	–
11				0–62	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–62	–
12				0–37	
	Forb, annual	2FA	<i>Forb, annual</i>	0–37	–
<b>Shrub/Vine</b>					
13				25–123	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	25–123	–
14				0–62	
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0–62	–
15				62–185	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	62–185	–
	rabbitbrush	CHRYS9	<i>Chrysothamnus</i>	62–185	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	62–185	–

## Animal community

This site is favorable for livestock grazing during most of the grazing periods except when snow cover restricts availability of forage.

Habitat diversity for wildlife is poor because of the vegetation complex. However, productivity on the site is very

good for adapted species. Antelope, deer and rabbits are typical animals found on the site.

## Recreational uses

This site usually occurs as low swales in rolling plains. It is an open grassland with a few interspersed shrubs. Winters are quite cold and early spring tends to be very windy. Late spring, summer, and fall provide good weather for outdoor activities. Sport hunting is the primary recreational activity on the site. Other activities include cross-country riding and wildlife observation.

## Other information

Stock tanks are often built successfully on this site.

## Type locality

Location 1: Mohave County, AZ	
General legal description	BLM exclosure, 6 miles toward Ide Valley on Road 64 from Main Street on the Arizona Strip.

## 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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Unknown

## 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)	Kenneth Gishi
Contact for lead author	State Rangeland Management Specialist - NRCS State Office - Phoenix, AZ
Date	08/27/2012
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Very few expected due to the high plant cover potential site. Rills may occur due to finer textures, slow permeability, medium runoff, moderate to high shrink/swell (cracking) characteristic of many soils and rare to occasional flooding. The number and length of rills will be limited by the low slopes on the site.
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2. **Presence of water flow patterns:** Water flow patterns (and occasional ponding) may be common due to the slow permeability of the soils. Water flow patterns should be short and shallow.

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3. **Number and height of erosional pedestals or terracettes:** Few expected, pedestals should be very short and along water flow patterns. Terracettes should also be very short and stop at obstructions.

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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 is expected to be less than 20%.

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5. **Number of gullies and erosion associated with gullies:** Very few expected. Due to occasional flooding and extra run-on moisture a few gullies can form in areas where water flow is concentrated from adjacent uplands. There should be no active erosion and the site should have vegetation stabilizing the gully.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None expected.

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7. **Amount of litter movement (describe size and distance expected to travel):** None expected. During or after severe droughts, a few minor areas of depositions or hummock clay deposits may be present.

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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 surface textures range from silt loam to clay, but are mostly sandy clay loam to clay. The expected soil stability average ranges between 3-5. When well vegetated and not subjected to severe flood events, these soils have a low to moderate resistance to water erosion and a high 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):** Soil surface structure is usually moderate very fine granular structure that is massive. Surface horizon thickness is generally 2 to 10 inches. Some soils may have been altered by past farming practices and have altered soil structure and thickness. Color is variable depending upon 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:** The site is characterized by a relatively even distribution of vegetation dominated by grasses with some scattered shrubs and lesser amounts of forbs. This plant community structure 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 expected. Some soils may have a naturally platy surface 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: Cool season grasses > Warm season grasses >

Sub-dominant: Large shrubs > Half shrubs >

Other: Perennial forbs > Annual forbs

Additional:

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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):** Litter cover is mostly fines with depths usually less than ½". Litter depths will be the greatest under canopies. Of the total litter amount, it would be expected that approximately 80-90% would be herbaceous litter and 10-20% would be 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 1000 to 1200 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:** Mat muhly, tumble grass, threeawn, snakeweed and rubber rabbitbrush are all native to the site, but they have the potential to increase and dominate the site after heavy grazing or surface disturbance. Russian thistle, filaree, cheatgrass, tamerisk and Russian olive are non-natives that can invade with or without disturbance.
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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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